1992

PERFORMANCE REPORT

WATER QUALITY ANALYSES SECTION

JANUARY 1994

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Ministry of
Environment
and Energy

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INTRODUCTION

The Water Quality Analyses Section (WQAS) is part of the Ministry of the Environment's and Energy Laboratory Services Branch. The WQAS provides the Ministry with expertise in microbiology and inorganic chemistry. The largest number of tests in the branch are handled by the Water Quality Units, where technicians analyze a broad spectrum of environmental sample types including: ground water, surface water, drinking water, precipitation, sewage, industrial waste, landfill leachate, soil and soil extract.

This report provides an outline of WQAS quality control (QC) program along with a summary of the resulting 1992 performance data for each test. WQAS strives to maintain a high standard of analytical performance through its quality assurance program and QC is an integral part of the process.

ACKNOWLEDGEMENTS

The editor would like to thank the technical staff in the Water Quality Analyses Section for their assistance in accumulating the quality control data, and acknowledges the contribution provided by all supervisors, scientist and manager.

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1.0 PERFORMANCE REPORT FORMAT

The performance report is divided into three parts. Part One outlines the report profile and, Parts Two and Three indicate the quality control programs and performance summaries for chemistry and microbiology respectively.

A performance report is generated for each test conducted in WQAS with the exception of those parameters where no data or less than three pieces of data exist for 1992. It usually consists of three pages: the test description page, the performance data summary page, and the quality control graphics page. The performance report is organized first, alphabetically according to test name (eg. Total Organic Carbon is filed under the heading "Carbon, Total Organic") second, by work station code and third, by test name code. If more than one test is performed at a work station, the test name code is bracketed in the title. Detailed information concerning each of these pages is outlined next.

1.1 TEST DESCRIPTION PAGE

TITLE:

The name of the test parameter.

IDENTIFICATION:

Laboratory:	Location where the test is performed.
LIS* Test Name Code:	LIS code for analysis request.
Work Station Code:	LIS code for sample routing to the work station.
Method Code:	LIS code for the analytical procedure.
Method Reference No:	A number assigned by the Quality Managemnent Office to an analytical test method eg.(E3228A). E3 denotes a Central Regional Lab test method. The subsequent three numbers are issued sequentially per method. A letter at the end denotes revision status.
Sample Type/Matrix:	The various sample types that can be routed to the work station.
Method Introduced:	Date that the method was implemented at the laboratory.
Units:	Unit of measurement in which the results are reported.
Unit Code:	LIS code for the unit of measurement in which the results are reported.
Supervisor:	Name of supervisor responsible for the designated laboratory.

*LIS - Laboratory Information System

SAMPLING:

The type of container and preservative (if applicable) that is used and minimum volume of sample that is usually required (10). Any sample preparation that is normally performed in the field, is also indicated.

SAMPLE PREPARATION:

Sample preparation techniques which are usually performed at the laboratory before analysis.

ANALYTICAL PROCEDURE:

Analytical method used to determine the parameter.

INSTRUMENTATION:

Type of instrumentation, used to perform the test. Automated continuous flow systems, consist of a sampler, peristaltic pump, manifold for reagent addition, detection system and a readout system. Microcomputers are used to control the operation of analytical equipment and /or data acquisition.

REPORTING:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The value reported indicates the minimum amount of analyte measured under routine conditions. W is usually less than the standard deviation of duplicates near zero. The code <T is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

CALIBRATION:

The number of standards used to calibrate the analytical system plus blanks if applicable.

CONTROLS:

The calibration, drift, recovery, and interference controls that are used when applicable to ensure that the system is operating properly.

MODIFICATIONS:

Modifications to the test in 1992.

NOTES:

Explanatory notes which may aid the data user in interpreting results and information.

1.2 PERFORMANCE DATA SUMMARY PAGE

TITLE:

The name of the test parameter.

QUALITY CONTROL DATA FROM/TO:

The period of time over which data were collected.

LAB:

The laboratory in which the data was collected.

ANALYTICAL RANGE:

The full scale value for the analytical range is given in concentration units.

CALIBRATION CONTROL:

A table for the calibration control standards. The between run standard deviation (S), the within run standard deviation (S_w), the ratio S/S_w, and the ranges for acceptance limits of the control standards sums and differences.

RECOVERIES (Where applicable):

A table for the recovery control standards.

DUPLICATES:

A table of within run duplicate data. The data is sorted into a number of concentration spans. The coefficient of variation (%) is obtained by dividing the mean standard deviation (S_2) for a particular concentration span by the mean concentration of duplicate results in that span and multiplying by 100.

OTHER CHECKS (Where applicable):

A table for other checks.

1.3 QUALITY CONTROL GRAPHICS PAGE

TITLE:

The name of the test parameter, work station code, and units of measurement.

DATE FROM/TO:

Period of time over which data were collected.

CALIBRATION CONTROL:

Calibration control standards sums and differences are plotted on a horizontal scale for the period of data collection (referred to on the graphs as "QUALITY CONTROL STANDARD A+B" for example). The vertical scale consists of the control limits expressed on either side of the expected value. Control limits were chosen from previous analytical performance data.

PART 2.0

CHEMISTRY

2.1 Quality Control Program - Chemistry

Quality control is a continuous process that involves constant checks of sample processing. Control activities that are conducted before sample analysis begins are checks on reagent chemicals, water purity, materials that are in contact with sample, and calibration.

Reagent chemicals are selected according to specific test method requirements.

Water purity is checked by daily monitoring for conductivity. Operations generally require conductivity levels of ≤ 1 µS/cm. Some procedures require distilled water to be further refined by a deionizing system.

Material checks are done on sample containers, filters, glassware and other equipment. These are checked for leaching, adsorption and contamination.

Calibration is conducted by analyzing a series of calibration standards covering the analytical range. Since a high degree of both precision and accuracy is required to detect and minimize any between-run changes, the standards are analyzed with as little handling as possible.

Once a system has been calibrated, quality control begins. Depending on the analytical procedure, quality control may be used to evaluate: calibration, blank, recovery, sensitivity, potential interference, and sample repeatability.

Calibration and Blank

Calibration is controlled by a minimum of two quality control standards and a long term blank which are prepared and maintained independently of the calibration standards. The system is not calibrated with the quality control standards. The long term blank is prepared identical to the qulity control standards but with zero concentration of the analyte. Control standards are prepared less frequently than calibration standards and errors in newly prepared calibration standards can be detected by this cross check. Newly prepared control standards are run in parallel with the old control standards and must meet control requirements over three consecutive runs before the new standards are accepted on line.

The standard deviation of the control standards is used to estimate the between run standard deviation (S) and is compared against the within run standard deviation (S_w). If the ratio S/S_w exceeds 1.5 then poor control of systematic error can be inferred (1). Values for S and S_w are calculated as follows:

$$2S^2 = (S_A)^2 + (S_B)^2 \qquad 2S_w^2 = (S_{A-B})^2$$

Where

S_A = standard deviation of control standard A

S_B = standard deviation of control standard B

S_{A-B} = standard deviation of the difference between control standards A and B

NOTE: If a second range is employed for a test, more control standards are used because, in many systems, the between run standard deviations are concentration dependent.

Detailed description of the quality control processes are outlined in several LSB reports (2)(3)(4)(5).

Control Limits

The control standards data are assessed and compared against the control limits established from previous data to determine whether the calibration process is in control. The control limits are examined yearly and may be adjusted if the method performance improves and/or the historical data base is increased. Control limits are calculated for the sums and differences of control standards (A,B,C,D) by the equations:

$(A+B) \pm 4.0 \times S_{A-B}$ for the sum of A+B
$(B+C) \pm 4.0 \times S_{B-C}$ for the sum of B+C
$(C+D) \pm 4.0 \times S_{C-D}$ for the sum of C+D

$(A-B) \pm 3.0 \times S_{A-B}$ for the difference A-B
$(B-C) \pm 3.0 \times S_{B-C}$ for the difference B-C
$(C-D) \pm 3.0 \times S_{C-D}$ for the difference C-D

If a control limit is exceeded, the analysis is stopped, corrective action taken and the control standards are re-analyzed.

Recovery

Some methods require sample pre-treatment, such as digestion or extraction. A recovery check , suitable to that method, is required to estimate the efficiency of the pre-treatment. Recovery standards are usually prepared at 0%, 20% and 80% of full scale. The solutions are analyzed in the same manner as routine samples. Although these solutions are not used to calibrate the instrument, corrections for the blank and matrix effects are calculated and applied if necessary. For an analytical run to be accepted, the recoveries should be within $\pm(5\% + T/2)$ of their expected values. (T is defined in Appendix A). The average blank should be within three standard deviations of its historical mean. If a second range is employed for a test, at least one additional recovery standard is used.

Sensitivity and Baseline

Any change in the sensitivity of the instrumentation is monitored periodically by analyzing a standard that is usually 80% of full scale, and comparing the peak height to the original calibration standards. Baseline drift is usually recorded by periodic analysis of deionized, distilled water (DDW) which does not contain any of the analyte, but may be adjusted to correspond to sample pre-treatment.

Interference

Interference checks are run on any test where a substance may be present in large enough concentration to affect the results. The checks are near the threshold concentration, beyond which the methodological safeguards used to minimize the interferences are no longer effective. These checks indicate that the interferences have no effect up to the specified concentrations. Spiked samples are not analyzed on a routine basis.

Sample Repeatability

Generally, one sample out of twenty is run in duplicate up to a maximum of three per day. The samples are selected for non-adjacent, within-run duplicate analyses. By analyzing samples in duplicate, the ability of the analyst to obtain repeatable analytical results, within an analytical run, can be determined. For results to be acceptable, at least two-thirds of the duplicate data must conform to limits which are based on historical performance.

The observed differences in duplicate results are accumulated and sorted according to sample concentration span. A standard deviation is calculated for each sample concentration span. The algorithm differs from the conventional standard deviation as follows:

Conventional Std. Dev. (1)*

$$S_1 = \sqrt{\frac{\sum_{i=1}^{n} (\bar{x} - x_i)^2}{n-1}}$$

Std. Dev. of Duplicates (2)*

$$S_2 = \sqrt{\frac{\sum_{i=1}^{n'} (x_1 - x_2)_i^2}{2n'}}$$

* Standard deviations used for the data summaries.

Where

S_1 = sample standard deviation

S_2 = duplicate difference standard deviation

n = number of data

$\bar{x}$ = mean of data

$x_i = i^{th}$ result

$(x_1 - x_2)_i$ = difference of the i^{th} duplicate

n' = number of duplicate pairs

Reported values for duplicate standard deviations have been treated by robust statistical methods (6)(7). The standard deviation (S_2) of the duplicate difference is also expressed as the coefficient of variation (CV) using the untreated standard deviation.

$$CV = \frac{S_2}{\bar{X}} \times 100$$

2.2 PERFORMANCE SUMMARIES

CHEMISTRY

*** ACIDITY, GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/08/82
LIS Test Name Code	: ACDG	Units	: µg/L as H^+
Work Station Code	: PHACD	Unit Code	: 064801
Method Code	: 001BT5	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.0005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant. Data are subjected to Gran analysis.

pH and total fixed endpoint acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : LTBL (expected result is 16.6 µg/L as H^+) plus 2 standards, e.g. QCA

ACIDITY, GRAN

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92

Lab: Titration Analytical Range: - to 1000 µg/L as H^+

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	500.0	499.75	-0.25	2.31
B :	40	200.0	198.88	-1.12	2.47
A+B :	40	700.0	698.63	-1.37	3.38
A-B :	40	300.0	300.88	0.88	3.38

s.d.(AB) S(between runs): 2.4 Sw(within run): 2.4 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

662	-	738	for	A+B
272	-	328	for	A-B

DUPLICATES:

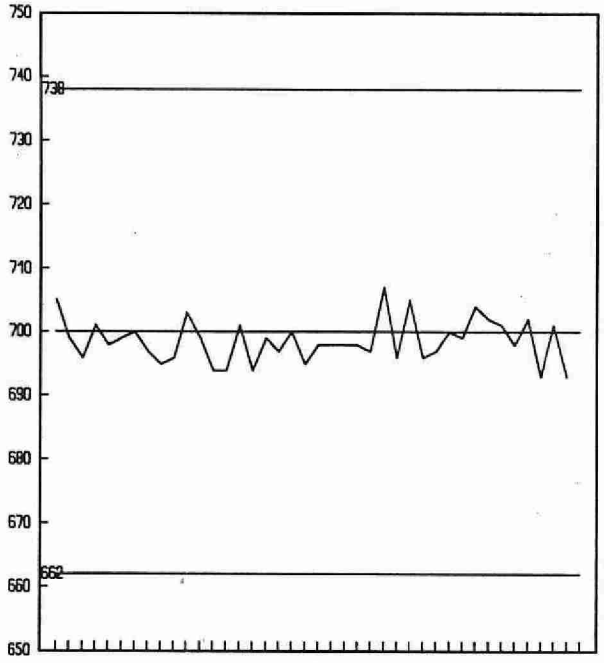
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
30	0	-	50	2.569	8.5
41	50	-	100	2.723	3.3
14	100	-	225	3.093	2.0
0	225	-	1000	N.A	N.A
85	Overall			2.729	

OTHER CHECKS:

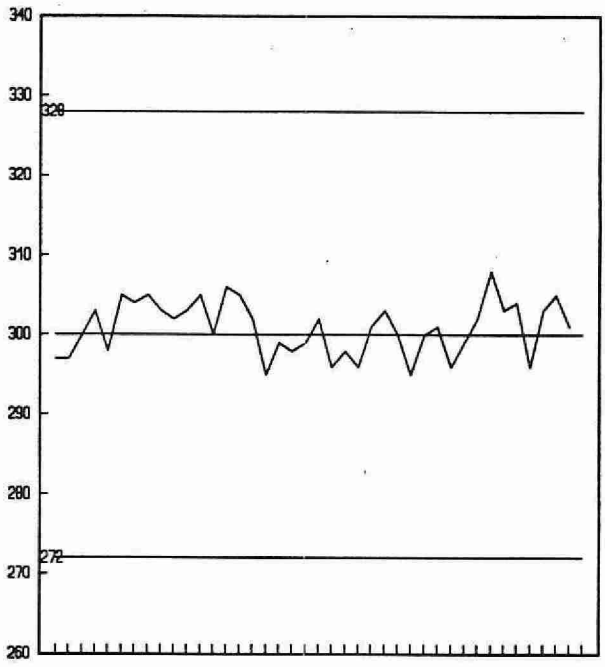
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	38	15.08	1.395

ACIDITY, GRAN (µg/L as H^+)

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ACIDITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: ACDT	Units	: mg/L as $CaCO_3$
Work Station Code	: PHACD	Unit Code	: 064915
Method Code	: 001BT2	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow, Domestic Waters, Rivers, Lakes (by special request: Industrial Waste, Sewage)		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample aliquots (10.0 mL) are titrated in an automated system with 0.01 N sodium hydroxide to pH >8.3. The titrant is standardized against 0.005 N potassium hydrogen phthalate. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH readings following each aliquot of titrant.

pH and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

ACIDITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92

Lab: Titration Analytical Range: - to 100.0 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	25.0	25.04	0.04	0.1259
B :	40	10.0	9.99	-0.01	0.1198
A+B :	40	35.0	35.03	0.03	0.1689
A-B :	40	15.0	15.06	0.06	0.1786

s.d.(AB) S(between runs): 0.12 Sw(within run): 0.13 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

32.8	-	37.2	for	A+B
13.4	-	16.6	for	A-B

DUPLICATES:

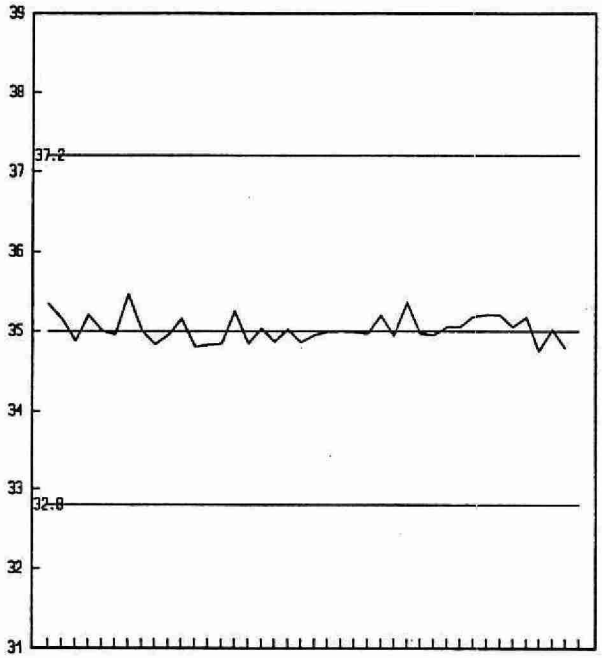
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
21	0.0	-	2.0	0.1405	7.0
52	2.0	-	5.0	0.1418	3.6
13	5.0	-	15.0	0.1571	2.2
0	15.0	-	100.0	N.A	N.A
86	Overall			0.1411	

OTHER CHECKS:

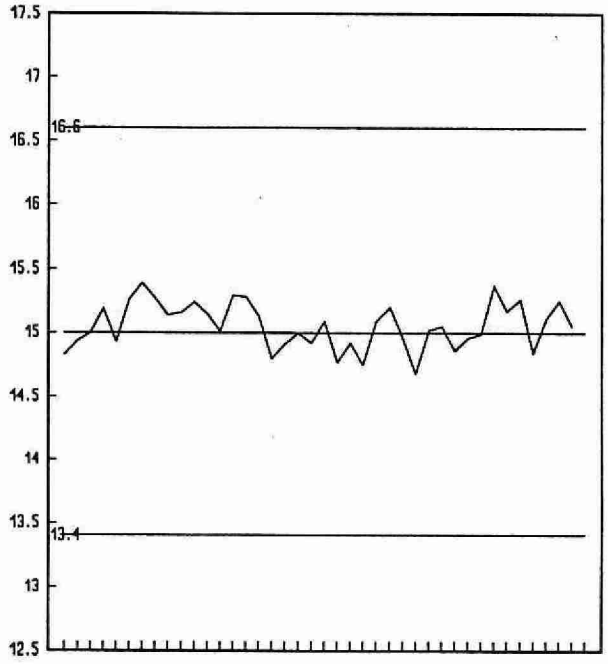
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	33	0.802	0.170

ACIDITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALKALINITY, GRAN ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKTI	Units	: mg/L as $CaCO_3$
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T6	Supervisor	: J. McBride
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required	: 150 mL
Container	: 250 mL Amber polyethylene bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH <3.7. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.
N.B. pH is determined simultaneously.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data reduction software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 2 standard buffers - 2 times daily

ALKALINITY, GRAN

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 25.00 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	202	20.00	20.21	0.21	0.357
B :	202	5.00	4.99	-0.01	0.129
A+B :	202	25.00	25.20	0.20	0.452
A-B :	202	15.00	15.22	0.22	0.289
C :	202	-5.0	-4.90	0.10	0.134
D :	202	-1.25	-1.19	0.06	0.107
C+D :	202	-6.25	-6.09	0.16	0.197
C-D :	202	-3.75	-3.70	0.05	0.141

s.d.(AB) S(between runs): 0.27 Sw(within run): 0.20 S/Sw: 1.3

s.d.(CD) S(between runs): 0.12 Sw(within run): 0.10 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

24	- 26	for	A+B
14	- 16	for	A-B
-8.89	- -3.61	for	C+D
-5.73	- -1.77	for	C-D

DUPLICATES:

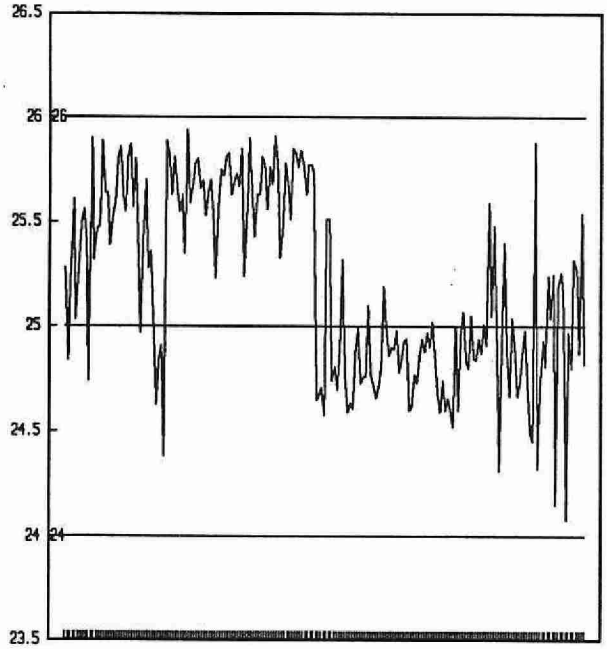
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
130	-9.0	-	0.0	0.083	N.A
100	0.0	-	1.0	0.073	15.1
236	1.0	-	5.0	0.066	2.3
82	5.0	-	10.0	0.075	1.4
74	10.0	-	25.0	0.095	1.1
582	Overall				

OTHER CHECKS:

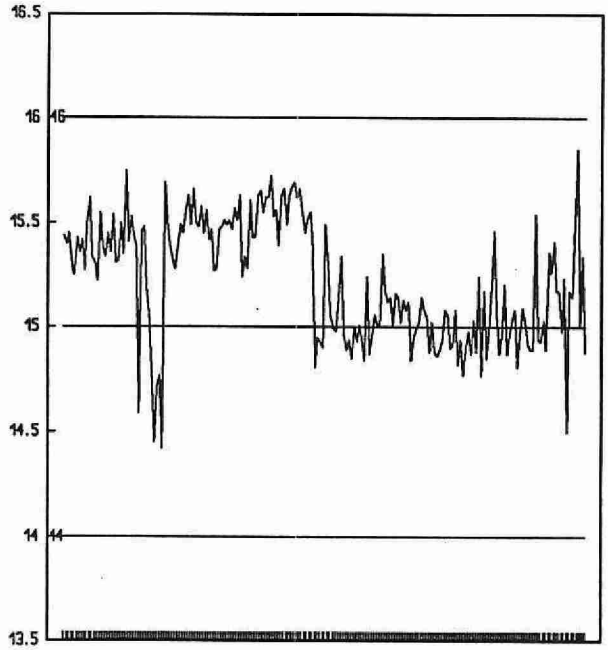
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	202	-0.153	0.136

ALKALINITY, GRAN (mg/L as CaCO3)

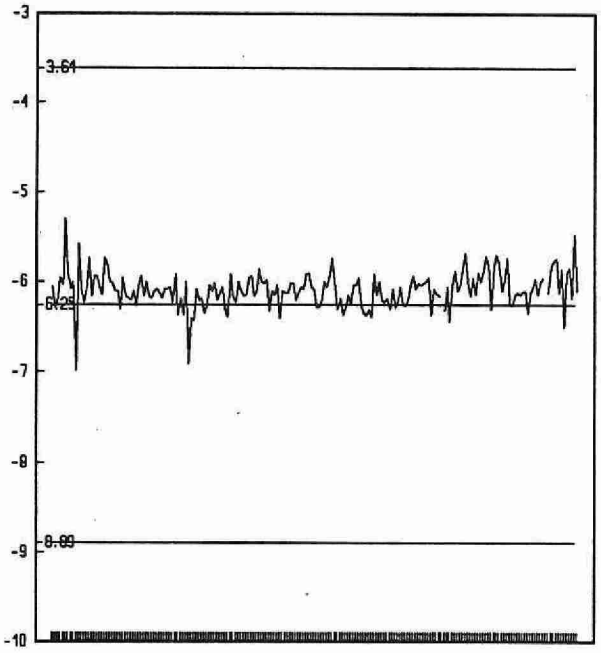
QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92



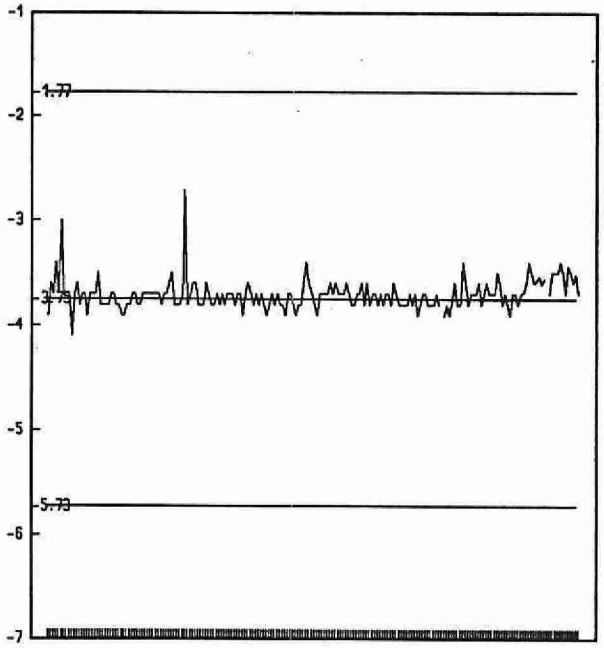
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALKALINITY, GRAN ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKTI	Units	: mg/L as $CaCO_3$
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.0. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant. Data are subjected to Gran analysis.

pH, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus two standards, e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 20% V/V)

NOTES:

Quality Control limits were changed on April 9, 1992. QC data prior to this date were under the control of former limits.

ALKALINITY, GRAN

QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92

Lab: Titration Analytical Range: - to 25.0 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
C :	41	10.0	9.958	-0.042	0.1752
D :	41	2.5	2.530	0.030	0.1128
C+D :	41	12.5	12.488	-0.012	0.2273
C-D :	41	7.5	7.428	-0.072	0.1875

s.d.(CD) S(between runs): 0.15 Sw(within run): 0.13 S/Sw: 1.10

On any given day the calibration is accepted if the values obtained lie within the ranges:

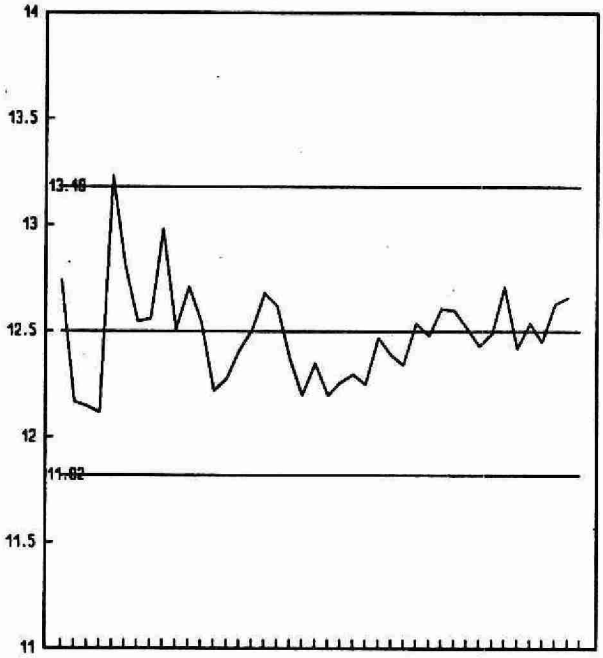
11.82	-	13.18	for	C+D
6.99	-	8.01	for	C-D

DUPLICATES:

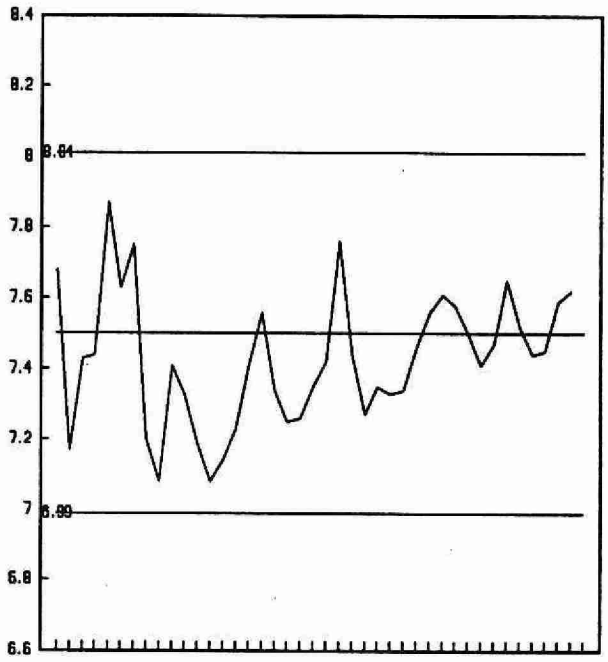
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
18	-2.0	-	10.0	0.1039	1.8
6	10.0	-	25.0	0.1818	1.5
24	Overall			0.1279	

ALKALINITY, GRAN (mg/L as CaCO3)

QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/07/79
LIS Test Name Code	: ALKT	Units	: mg/L as $CaCO_3$
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: J. McBride
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL

Container : Amber polyethylene bottle filled to the brim; screw cap with cone-shaped liner is preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

Drift : 2 standard buffers - once daily

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 05/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 100.00 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	200	20	20.024	0.024	0.340
B :	200	5	4.924	-0.076	0.111
A+B :	200	25	24.948	-0.052	0.419
A-B :	200	15	15.100	0.100	0.282

s.d.(AB) S(between runs): 0.25 Sw(within run): 0.20 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

24	- 26	for	A+B
14	- 16	for	A-B

DUPLICATES:

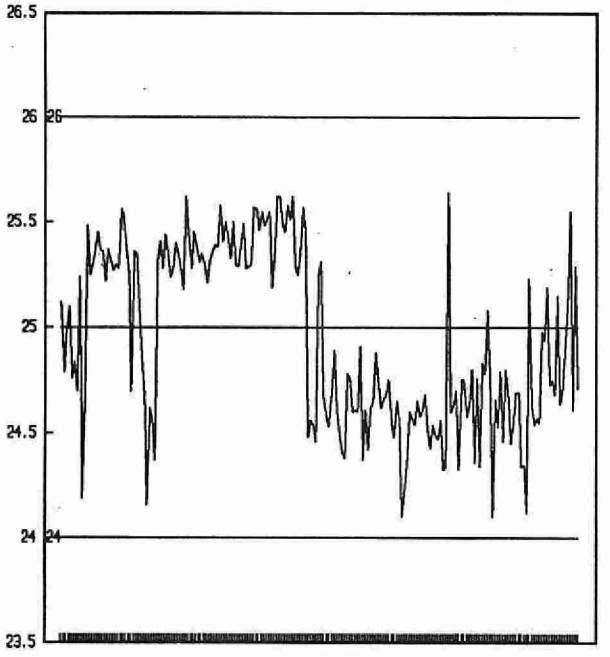
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
297	0.00 - 5.00	0.062	2.8
201	5.00 - 25.00	0.071	1.2
10	25.00 - 100.00	0.059	0.1
508	Overall	0.065	

OTHER CHECKS:

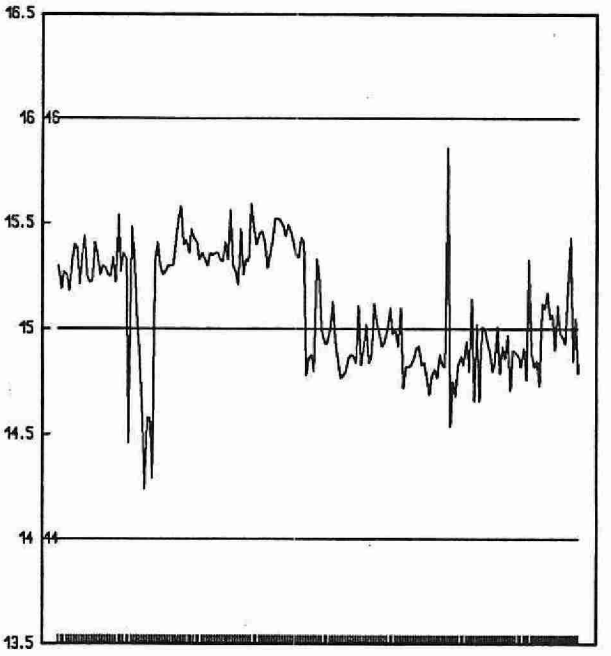
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	200	1.69	0.122

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

QUALITY CONTROL DATA FROM 05/01/92 TO 23/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as $CaCO_3$
Work Station Code	: RATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH <4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

pH, Gran alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 4 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92

Lab: Titration Analytical Range: - to 1000 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	111	250.0	249.97	-0.03	1.957
B :	111	50.0	50.08	0.08	0.585
A+B :	111	300.0	300.05	0.05	2.286
A-B :	111	200.00	199.90	-0.10	1.774
C :	111	10.0	9.92	-0.08	0.585
D :	111	2.5	2.49	-0.01	0.216
B+C :	111	12.5	12.41	-0.09	0.298
B-C :	111	7.5	7.43	-0.07	0.187

s.d.(AB) S(between runs): 1.44 Sw(within run): 1.25 S/Sw: 1.15

s.d.(CD) S(between runs): 0.18 Sw(within run): 0.13 S/Sw: 1.33

On any given day the calibration is accepted if the values obtained lie within the ranges:

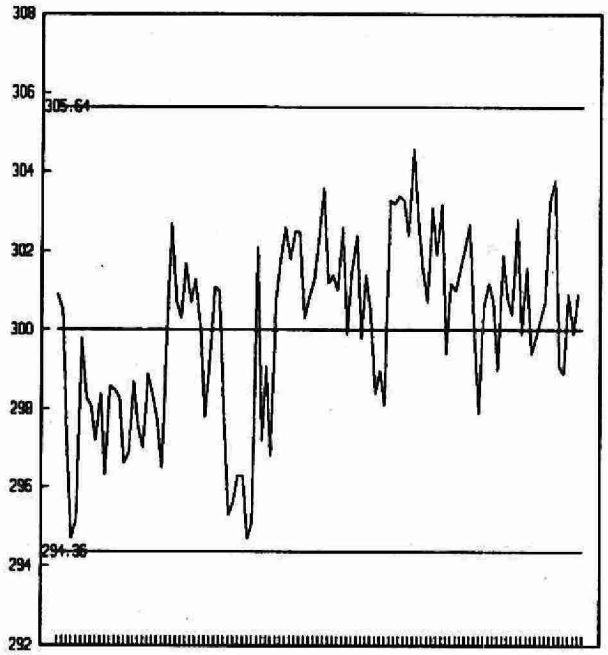
294.36	-	305.64	for	A+B
195.77	-	204.23	for	A-B
11.76	-	13.24	for	C+D
6.95	-	8.05	for	C-D

DUPLICATES:

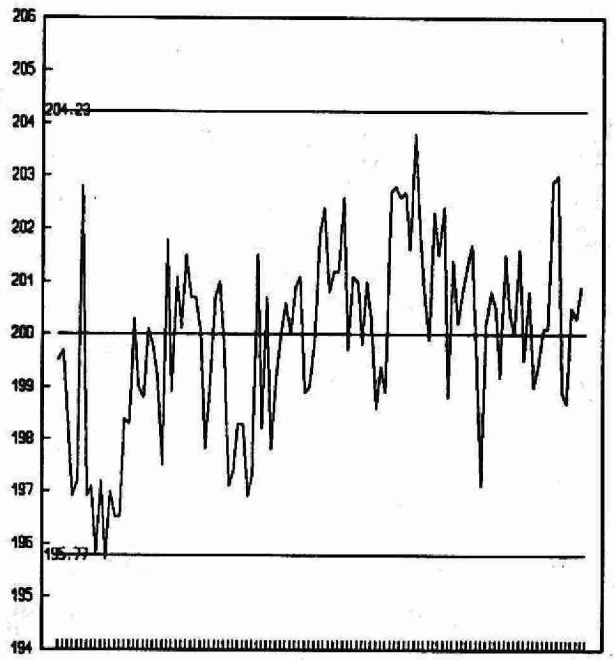
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
50	0.0	-	50.0	0.2106	1.2
38	50.0	-	100.0	0.7015	0.8
189	100.0	-	500.0	1.4689	0.7
1	500.0	-	1000.0	N.A	N.A
278	OVERALL			1.2861	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

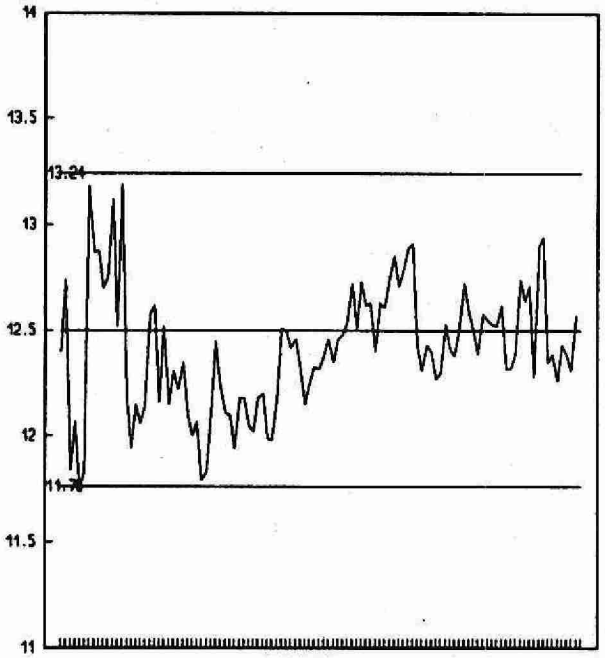
QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92



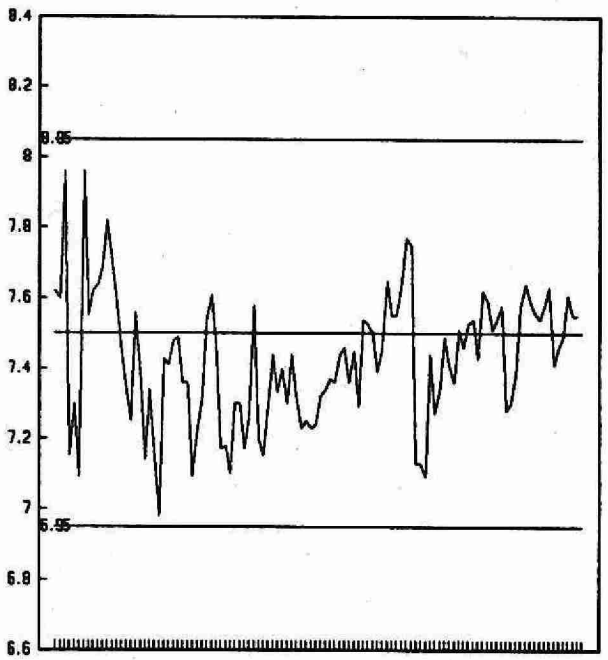
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: ALKT	Units	: mg/L as $CaCO_3$
Work Station Code	: WATS	Unit Code	: 064915
Method Code	: 004AT6	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.
pH, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

NOTES:

Quality Control limits were changed on April 9, 1992. QC data prior to this date were under the control of former limits.

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 03/01/92 TO 31/12/92

Lab: Titration Analytical Range: - to 1000 mg/L as CaCO3

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	160	250	250.64	0.64	1.938
B :	160	100	100.82	0.82	0.998
A+B :	160	350	351.45	1.45	2.667
A-B :	160	150	149.82	-0.18	1.546
C :	160	25	24.84	-0.36	0.317
B+C :	160	125	125.53	0.53	1.364
B-C :	160	75	75.85	0.85	1.003

s.d.(AB) S(between runs): 1.54 Sw(within run): 1.09 S/Sw: 1.4

s.d.(BC) S(between runs): 0.85 Sw(within run): 0.71 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

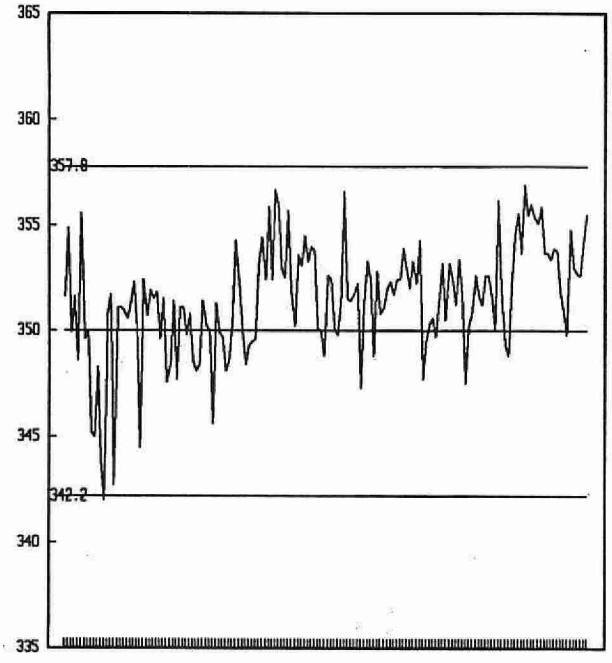
342.2	-	357.8	for	A+B
144.15	-	155.85	for	A-B
119.84	-	130.16	for	B+C
71.13	-	78.87	for	B-C

DUPLICATES:

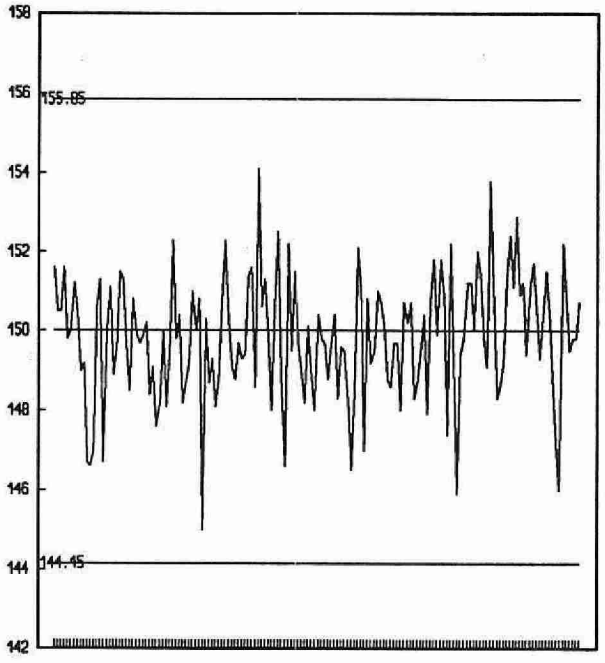
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
34	0.0	-	25.0	0.1916	5.2
128	25.0	-	100.0	1.0574	1.3
210	100.0	-	500.0	2.2783	1.1
4	500.0	-	1000.0	6.1108	1.3
376	Overall			1.6829	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

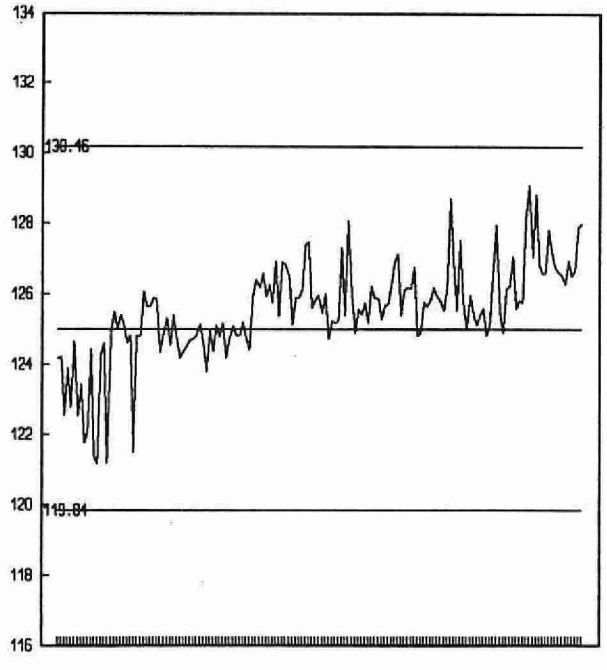
QUALITY CONTROL DATA FROM 03/01/92 TO 31/12/92



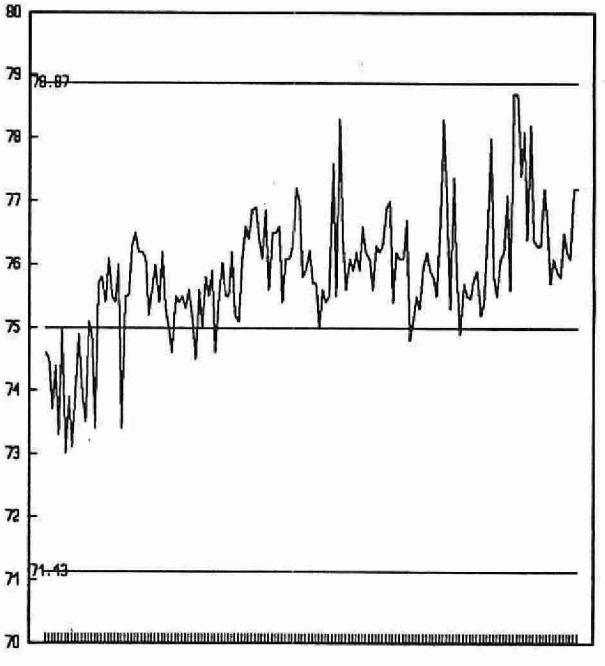
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before 1980
LIS Test Name Code	: ALKT	Units	: mg/L as $CaCO_3$
Work Station Code	: WQSDIRT	Unit Code	: 064915
Method Code	: 003MT3	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are pipetted manually (50.0 mL) and titrated with 0.02 N sulphuric acid to pH endpoint of 4.5. Analysis is performed on the supernatant or filtrate.

INSTRUMENTATION:

Automated modular titration system .

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: BL plus 2 standards, e.g. QCA
Drift	: In run standards throughout the run (100% tap water)

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92

Lab: Titration Analytical Range: - to 1000 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	25	570.0	567.6	-2.4	2.794
B :	25	114.0	115.5	1.5	0.835
A+B :	25	684.0	683.1	-0.9	3.438
A-B :	25	456.0	452.1	-3.9	2.278

s.d.(AB) S(between runs): 2.06 Sw(within run): 1.61 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

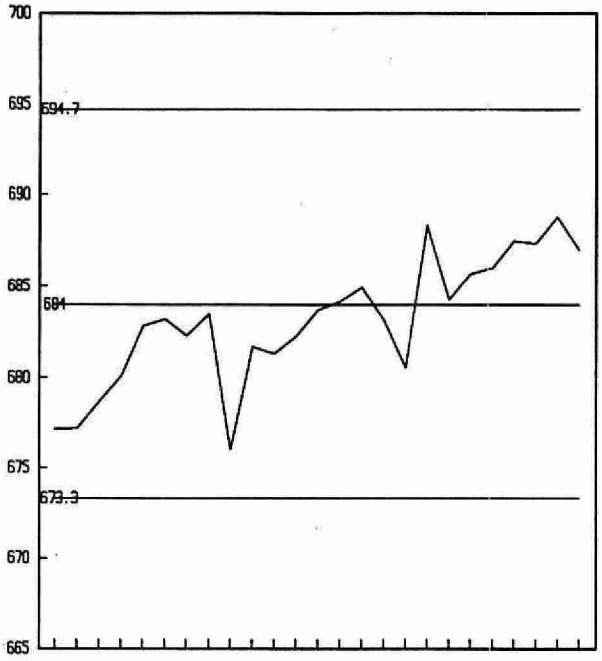
673.3	-	694.7	for	A+B
448	-	464	for	A-B

DUPLICATES:

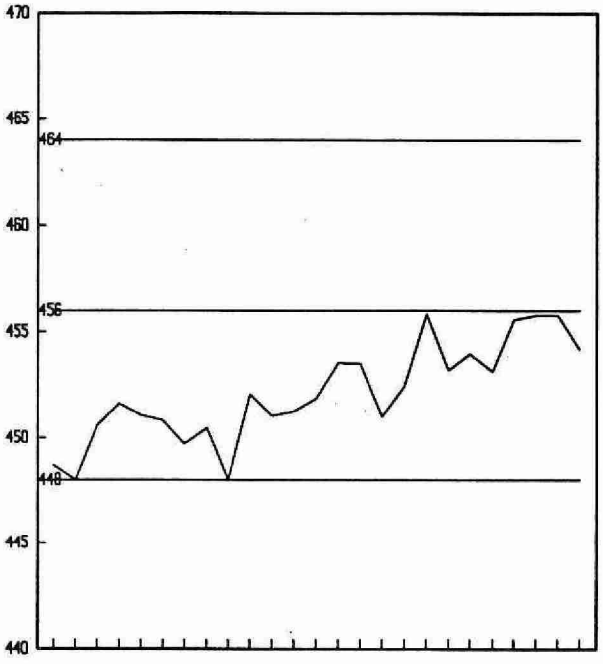
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
15	0.0 - 150.0	0.248	0.6
22	150.0 - 250.0	0.667	0.3
20	250.0 - 500.0	0.970	0.5
3	500.0 - 1000.0	1.224	0.2
60	OVERALL	0.659	

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALKALINITY, TOTAL FIXED ENDPOINT ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 21/10/85
LIS Test Name Code	: ALKT3	Units	: mg/L as $CaCO_3$
Work Station Code	: DOT	Unit Code	: 064915
Method Code	: 0905T3	Supervisor	: J. McBride
Method Reference No.	: E3042A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Groundwaters		

SAMPLING:

Quantity Required : 150 mL

Container : Amber polyethylene bottle filled to the brim; screw cap with cone-shaped liner is preferred.

ANALYTICAL PROCEDURE:

Samples (100 mL) are weighed (volume = weight), and titrated with 0.02 N sulphuric acid to a pH 3.8. The titrant delivery rate is determined from the slope of the titration curve and the stability of the pH reading following each aliquot of titrant.

INSTRUMENTATION:

Semi-automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA

Drift : 2 standard buffers - once daily

ALKALINITY, TOTAL FIXED ENDPOINT

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 100.0 mg/L as $CaCO_3$

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	199	20.00	20.26	0.26	0.389
B :	199	5.00	4.99	-0.01	0.221
A+B :	199	25.00	25.24	0.24	0.540
A-B :	199	15.00	15.26	0.26	0.329

s.d.(AB) S(between runs): 0.32 Sw(within run): 0.23 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.28	-	26.72	for	A+B
13.50	-	16.50	for	A-B

DUPLICATES:

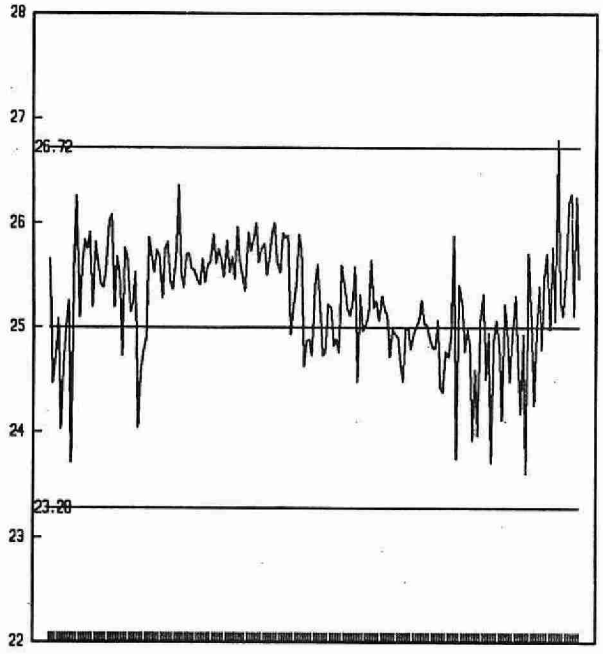
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
245	0.0	-	10.0	0.232	3.4
305	10.0	-	20.0	0.247	2.3
26	20.0	-	50.0	0.263	1.0
7	50.0	-	100.0	0.171	0.3
583	Overall			0.241	

OTHER CHECKS:

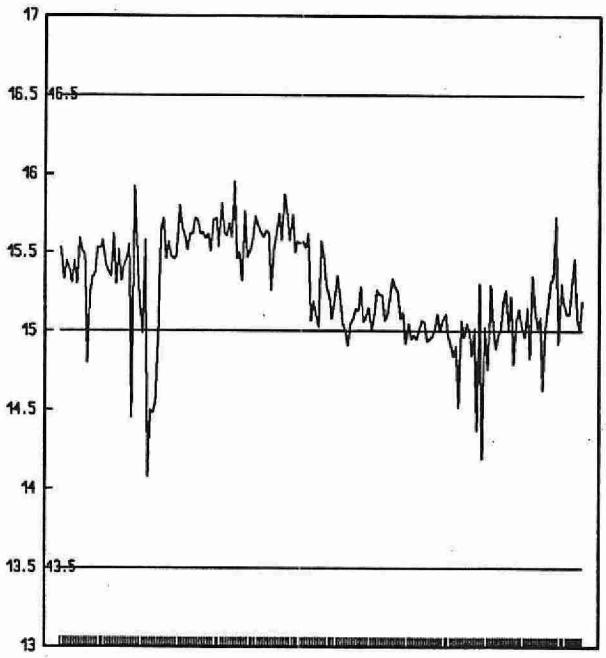
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	199	8.57	0.439

ALKALINITY, TOTAL FIXED ENDPOINT (mg/L as CaCO3)

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** ALUMINUM, REACTIVE SPECIES ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced:	24/10/85
LIS Test Name Code	: ALEXCV,ALNDCV	Units	: µg/L as Al
Work Station Code	: DOALSP	Unit Code	: 063813
Method Code	: 0928C2	Supervisor	: J. McBride
Method Reference No.	: E3256A, E3020A		
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required	: 30 mL
Container	: Plastic or glass

ANALYTICAL PROCEDURE:

The procedure is based on the formation of an aluminum catechol-violet complex at pH 6.2. Phenanthroline hydroxylamine HCl reagents are used to reduce interference by iron. An ion exchange column is used for separating organic and inorganic aluminum. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards and reported as µg/L as CV reactive Al.

INSTRUMENTATION:

Automated auto-analyzer/sampler system with colourimeter and chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 10 standards daily

CONTROLS:

Calibration	: LTBL plus 4 standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standard every 20 samples

ALUMINUM, REACTIVE SPECIES
(ALEXCV)

QUALITY CONTROL DATA FROM 08/01/92 TO 17/12/92

Lab: Dorset Analytical Range: - to 1000 µg/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	68	750.0	747.7	-2.3	11.04
B :	68	250.0	245.8	-4.2	6.12
A+B :	68	1000.0	993.5	-6.5	15.36
A-B :	68	500.0	501.8	1.8	9.09
C :	68	75.0	73.1	-1.9	3.69
D :	68	25.0	22.8	-2.2	3.46
C+D :	68	100.0	96.0	-4.0	6.21
C-D :	68	50.0	50.3	0.3	3.55

s.d.(AB) S(between runs): 8.9 Sw(within run): 6.49 S/Sw: 1.4

s.d.(AB) S(between runs): 3.6 Sw(within run): 2.5 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

965	- 1035	for	A+B
480	- 520	for	A-B
85	- 115	for	C+D
40	- 60	for	C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
92	0	-	50	3.89	18.0
49	50	-	100	4.93	8.8
54	100	-	250	5.04	5.5
2	250	-	500	N.A.	N.A.
0	500	-	1000	N.A.	N.A.
197	Overall			4.38	

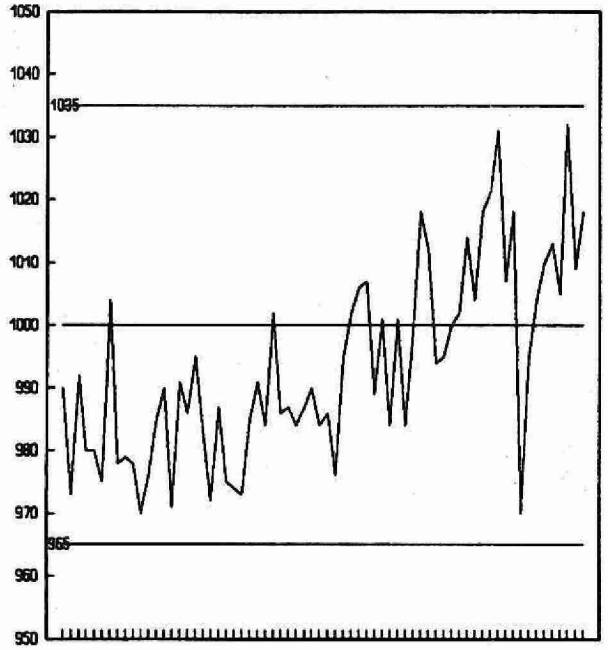
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	68	0.838	1.180

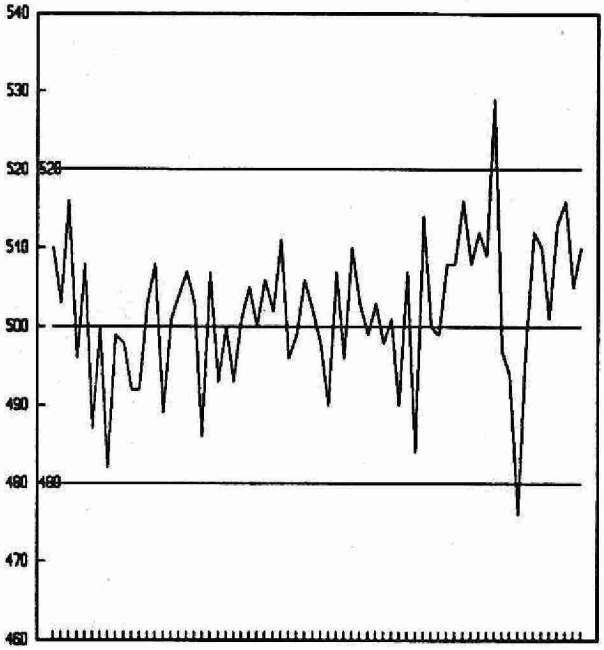
ALUMINUM, REACTIVE SPECIES (µg/L as AL)

(ALEXCV)

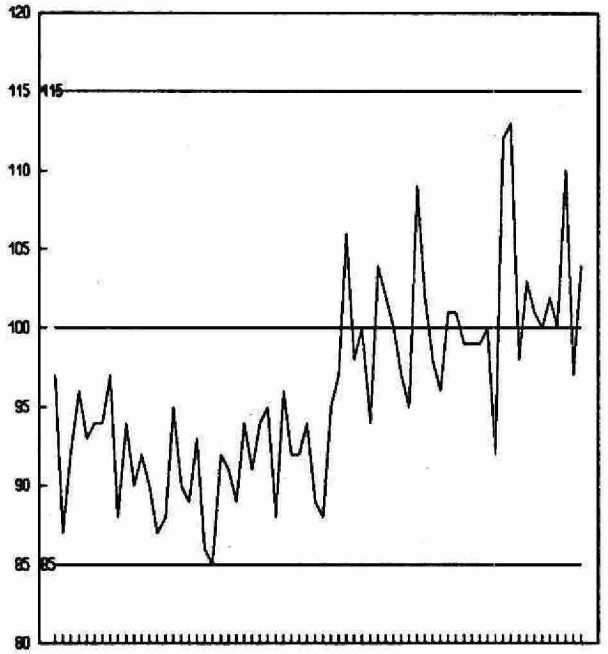
QUALITY CONTROL DATA FROM 08/01/92 TO 17/12/92



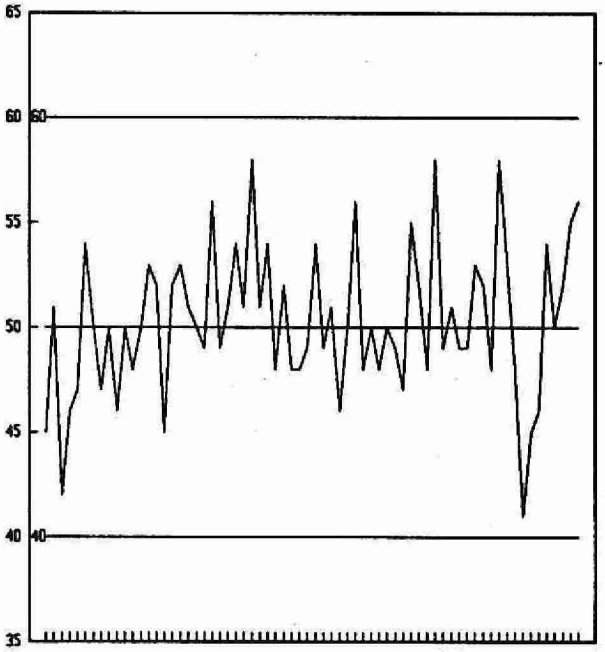
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

ALUMINUM, REACTIVE SPECIES
(ALNDCV)

QUALITY CONTROL DATA FROM 08/01/92 TO 17/12/92

Lab: Dorset Analytical Range: - to 1000 µg/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	68	750.0	745.5	-4.5	9.00
B :	68	250.0	245.7	-4.3	3.63
A+B :	68	1000.0	991.2	-8.8	12.23
A-B :	68	500.0	499.8	-0.2	6.25
C :	68	75.0	72.3	-2.7	2.97
D :	68	25.0	22.5	-2.5	3.77
C+D :	68	100.0	94.8	-6.2	5.92
C-D :	68	50.0	49.8	-0.2	3.32

s.d.(AB) S(between runs): 6.9 Sw(within run): 4.4 S/Sw: 1.6

s.d.(AB) S(between runs): 3.4 Sw(within run): 2.3 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

965	- 1035	for	A+B
480	- 520	for	A-B
85	- 115	for	C+D
40	- 60	for	C-D

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
112	0	-	100	3.33	8.1
50	100	-	250	4.56	4.0
34	250	-	500	10.00	4.0
4	500	-	1000	36.59	4.3
200	Overall			4.56	

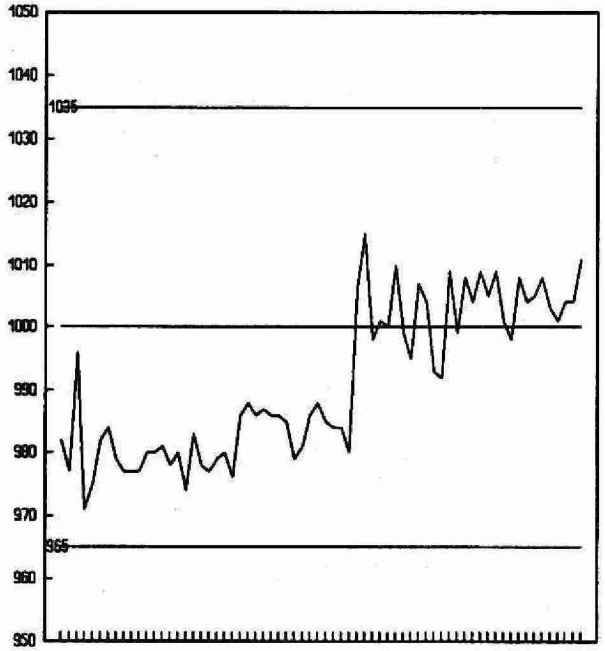
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	68	0.897	1.148

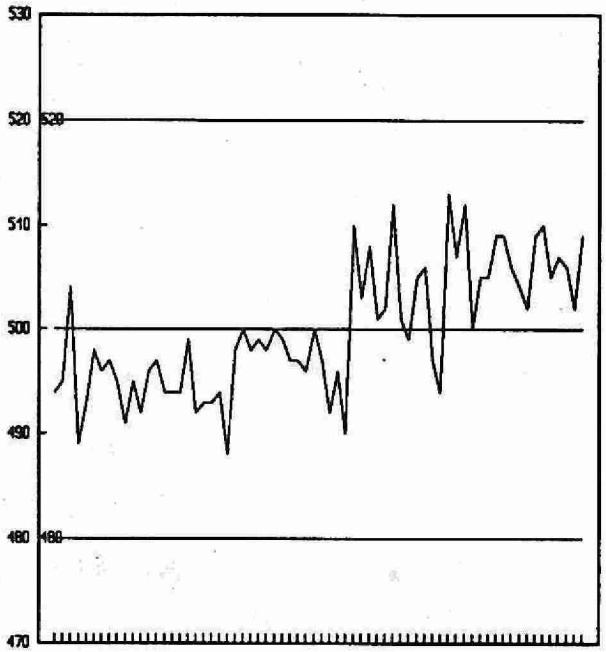
ALUMINUM, REACTIVE SPECIES (µg/L as Al)

(ALDNCV)

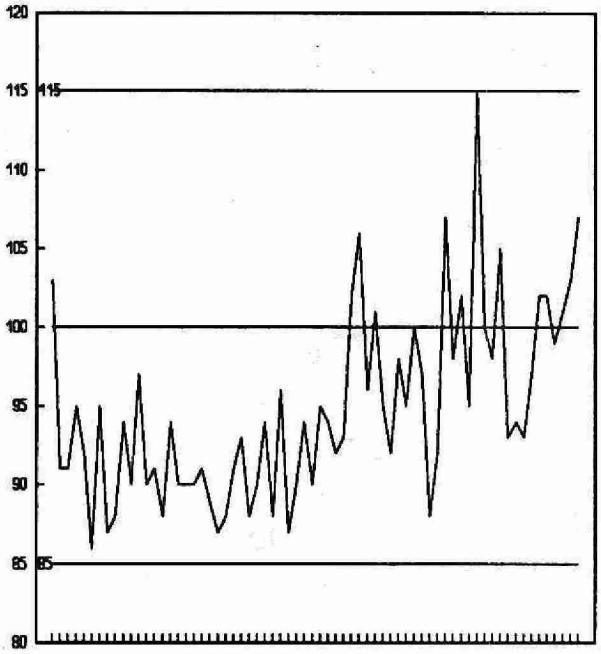
QUALITY CONTROL DATA FROM 08/01/92 TO 17/12/92



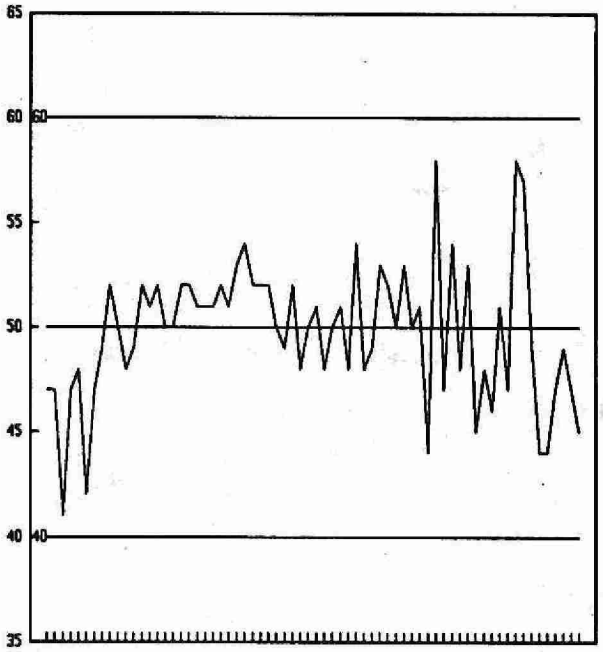
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** ALUMINUM, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 06/09/83
LIS Test Name Code	: ALUT	Units	: µg/L as Al
Work Station Code	: DOAL	Unit Code	: 063813
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3299A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Biota and Groundwaters		

SAMPLING:

Quantity Required	: 10 mL
Container	: 100 mL Polyprophylene bottle capped, acidified to 0.1% with HNO_3

ANALYTICAL PROCEDURE:

This procedure is based on the formation of an aluminum-catechol violet complex at pH 6.2. Acidified samples are oxidized by UV digestion for total aluminum. Phenanthroline-hydroxylamine-HCL reagents are used to reduce interference by iron. Concentrations of aluminum are determined by comparison with a similarly prepared series of standards.

INSTRUMENTATION:

UV-digestor
An autoanalyzer with microprocessor for DCI system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 8 standards daily

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standards every 20 samples.

NOTES:

Work station was formerly DOAAS and Al measurements were made by GFAAS. The method and work station was changed in April 1992 to DOAL.

ALUMINUM, TOTAL

QUALITY CONTROL DATA FROM 01/04/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 1000 µg/L as Al

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	60	500.0	503.6	3.6	3.86
B :	60	300.0	299.3	-0.7	2.72
A+B :	60	800.0	802.9	2.9	5.02
A-B :	60	200.0	204.4	4.4	4.41
C :	60	50.0	49.98	-0.02	1.21
B+C :	60	350.0	349.3	-0.7	3.02
B-C :	60	250.0	249.3	-0.7	2.93

s.d.(AB) S(between runs): 3.3 Sw(within run): 2.1 S/Sw: 1.6

s.d.(AB) S(between runs): 2.10 Sw(within run): 2.14 S/Sw: 0.98

On any given day the calibration is accepted if the values obtained lie within the ranges:

820	- 780	for	A+B
216	- 184	for	A-B
362	- 338	for	B+C
259	- 241	for	B-C

DUPLICATES:

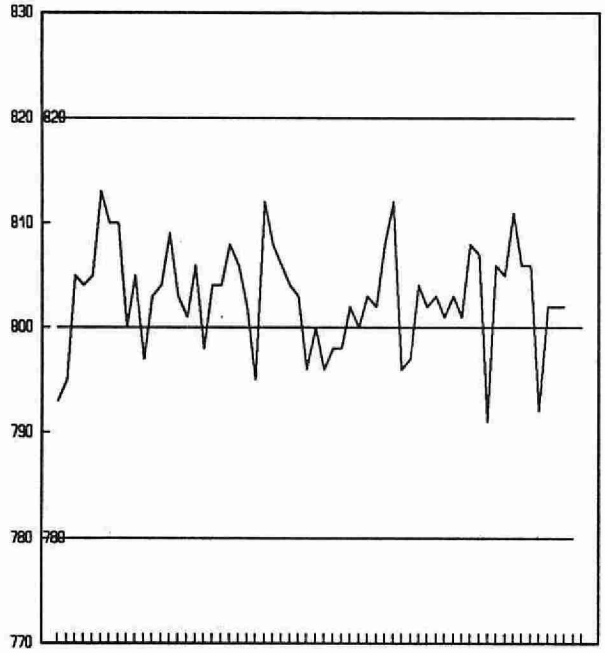
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
113	0.0 - 200.0	2.64	4.2
32	200.0 - 500.0	2.97	1.5
11	500.0 - 1000.0	6.61	0.9
156	Overall	3.02	

OTHER CHECKS:

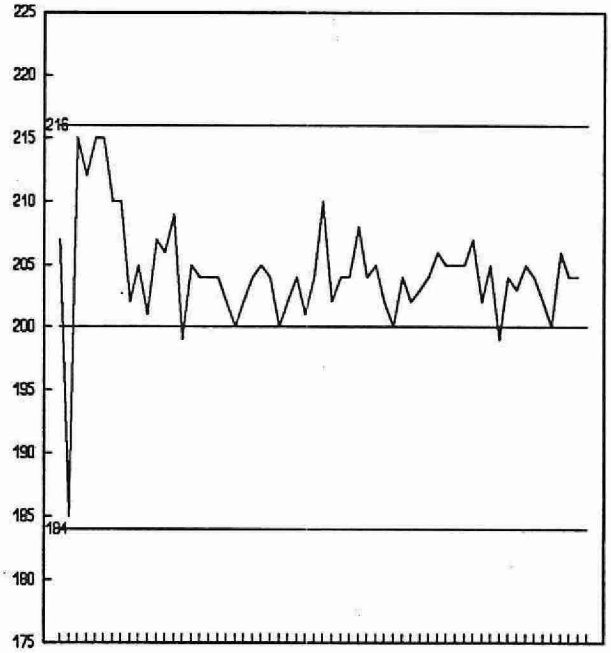
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	60	0.317	0.9111

ALUMINUM, TOTAL (µg/L as Al)

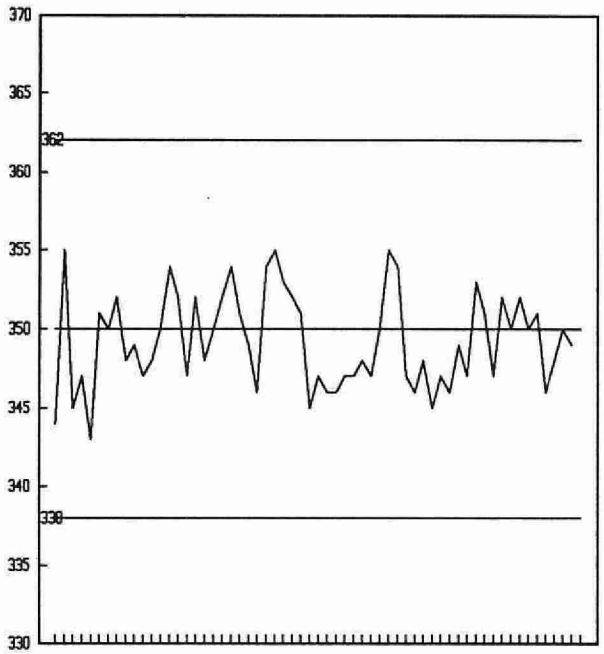
QUALITY CONTROL DATA FROM 01/04/92 TO 23/12/92



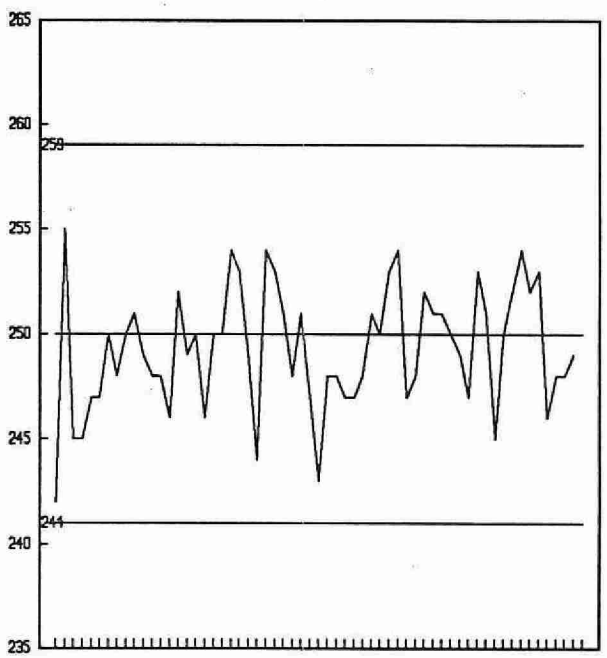
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CADMIUM, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 26/11/84
LIS Test Name Code	: CDUT	Units	: µg/L as Cd
Work Station Code	: DOTRACE	Unit Code	: 063848
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3305A		
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 5 mL
Container	: Glass or plastic, capped, acidified to 0.25% with HNO_3

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 228.8 nm.
Approximate absorbance: 0.400 at the full scale level

INSTRUMENTATION:

Varian graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards.

CONTROLS:

Calibration	: 1 NRC sample, 3 duplicates
Drift	: 1 blank plus 1 standard

NOTES:

Work station was formerly DOAAS and changed in August 1991 to DOTRACE.

CADMIUM, TOTAL

QUALITY CONTROL DATA FROM 22/08/91 TO 04/12/91

Lab: Dorset Soils

Analytical Range: - to 5 µg/L as Cd

QUALITY CONTROL:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
NRC :	42	0.02914	0.002043

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
96	0.00 - 1.00	0.006	15.7
0	1.00 - 2.50	N.A	N.A
0	2.50 - 5.00	N.A	N.A
96	Overall	0.006	

OTHER CHECKS:

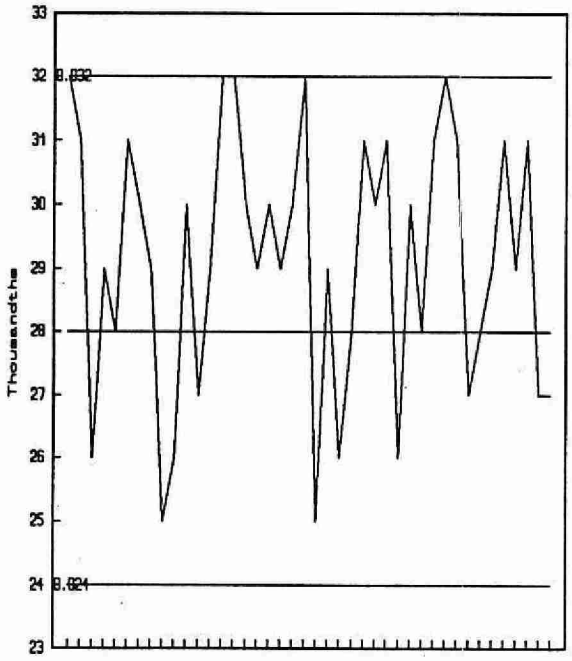
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	11	0.0374	0.0432

NOTES:

A new series of low level calibration control standards form EPA ampoules is currently in place and the data are currently being collected. Thus, only data from NRC analysis are provided for this report.

CADMIUM, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 16/01/92 TO 22/12/92



NRC REFERENCE SAMPLE

_____CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAA400	Unit Code	: 064820
Method Code:	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.02 to 0.005 in Feb. 1992, based on 2 years of low range duplicate mean standard deviation at 0.005 or less on the Varian AA 400 instrument.

CALCIUM

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92

Lab: Atomic Absorption Analytical Range: - to 2.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	41	1.20	1.2050	0.0050	0.0105
B :	41	0.20	0.2016	0.0016	0.0080
A+B :	41	1.40	1.4067	0.0067	0.0144
A-B :	41	1.00	1.0034	0.0034	0.0120

s.d.(AB) S(between runs): 0.0094 Sw(within run): 0.0085 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.35	-	1.45	for	A+B
0.960	-	1.04	for	A-B

DUPLICATES:

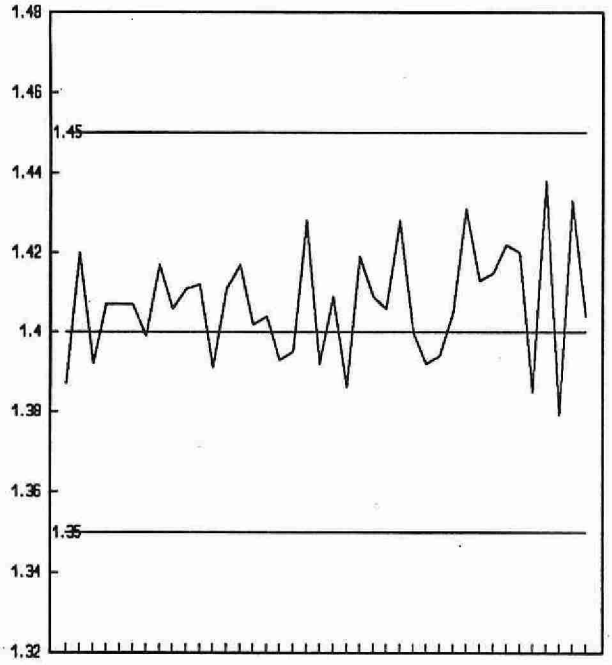
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
78	0.00	-	0.20	0.005	5.5
30	0.20	-	1.00	0.006	1.4
5	1.00	-	2.00	0.006	0.4
113	Overall			0.005	

OTHER CHECKS:

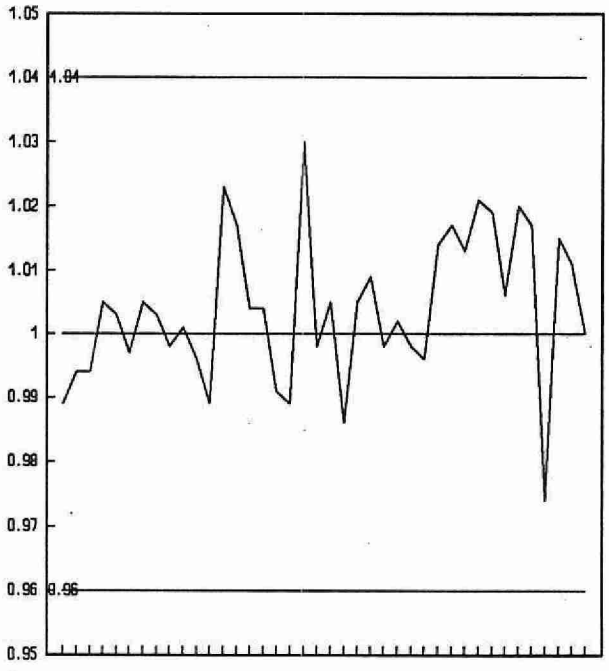
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	41	0.0005	0.0091

CALCIUM (mg/L as Ca)

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: PRAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.2 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

Quality Control limits were changed on June 17, 1992. QC data prior to this date were under the control of former limits.

CALCIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92

Lab: Atomic Absorption Analytical Range: - to 8.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	98	6.4	6.391	-0.009	0.0411
B :	98	1.6	1.608	0.008	0.0182
A+B :	98	8.0	7.999	-0.001	0.0513
A-B :	98	4.8	4.783	-0.017	0.0375
C :	98	0.4	0.402	0.002	0.0076
B+C :	98	2.0	2.010	0.010	0.0227
B-C :	98	1.2	1.206	0.006	0.0163

s.d.(AB) S(between runs): 0.032 Sw(within run): 0.026 S/Sw: 1.2

s.d.(BC) S(between runs): 0.014 Sw(within run): 0.012 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

7.85	-	8.15	for	A+B
4.69	-	4.91	for	A-B
1.95	-	2.05	for	B+C
1.16	-	1.24	for	B-C

DUPLICATES:

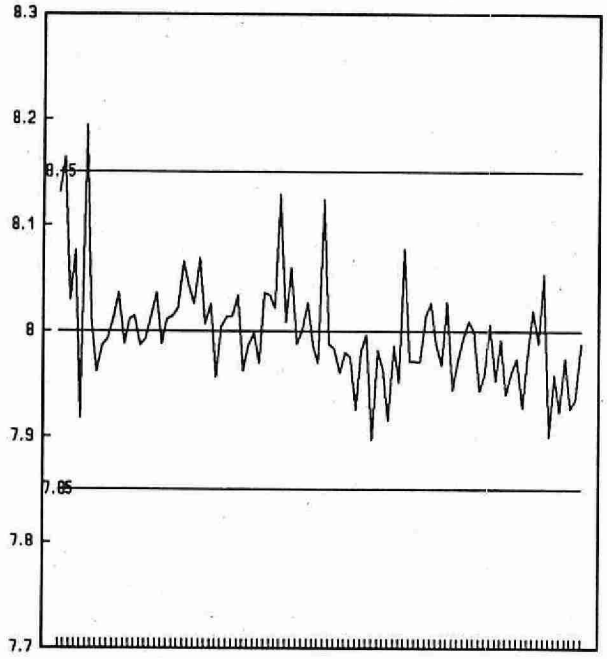
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
42	0.00	-	1.60	0.0096	1.2
124	1.60	-	3.00	0.0306	1.4
118	3.00	-	8.00	0.0489	1.2
284	Overall			0.0348	

OTHER CHECKS:

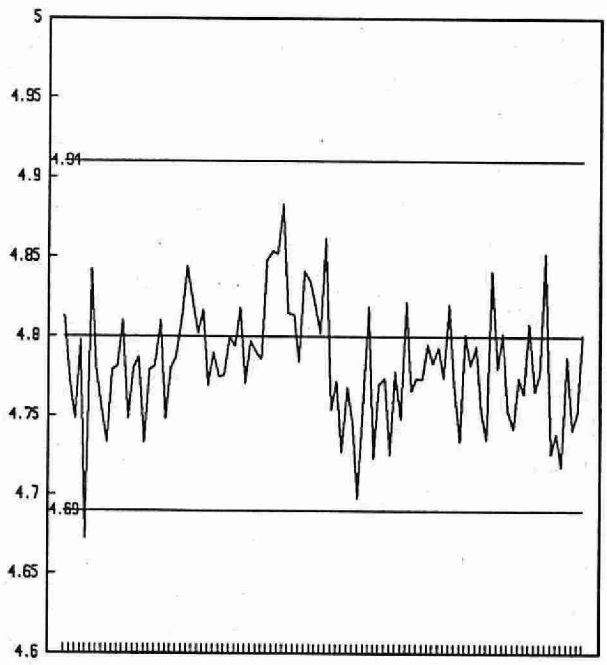
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	98	-0.006	0.033

CALCIUM (mg/L as Ca)

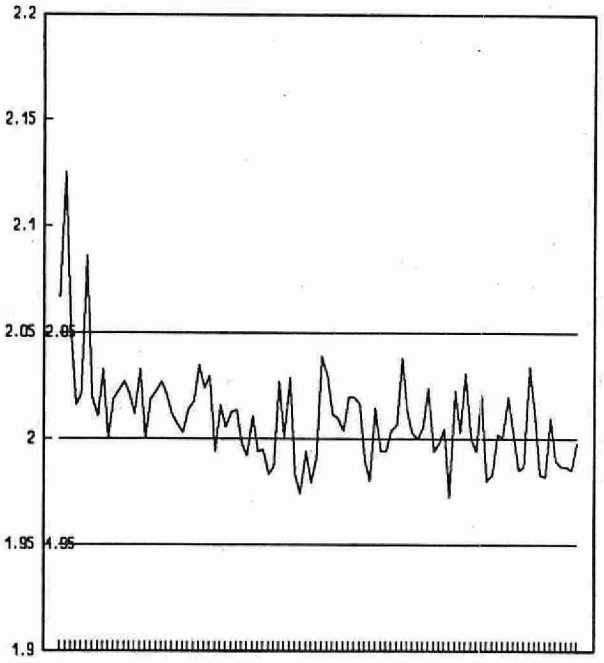
QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92



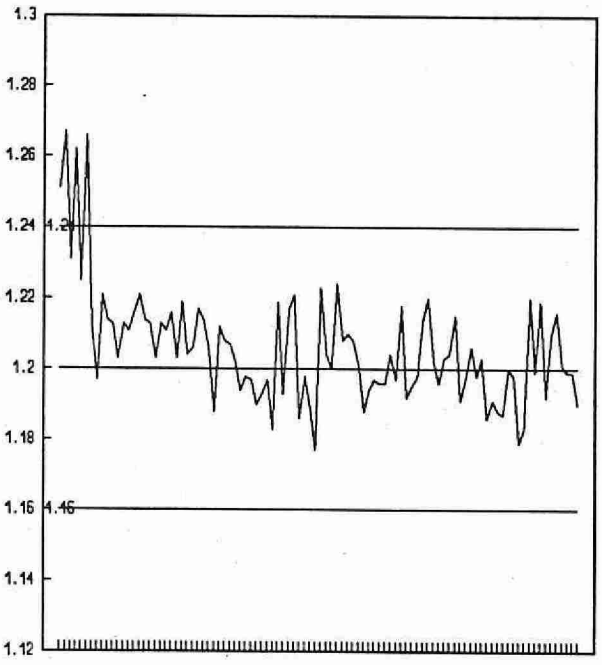
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: RMAAS	Unit Code	: 064820
Method Code	: 0901A1	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.14 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

NOTES:

W value was changed from 0.1 to 0.05 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.05 on the Varian AA 400 instrument.

Quality Control limits were changed on June 17, 1992. QC data prior to this date were under the control of former limits.

CALCIUM

QUALITY CONTROL DATA FROM 09/01/92 TO 30/12/92

Lab: Atomic Absorption Analytical Range: - to 40.00 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	153	32.0	31.88	-0.12	0.2639
B :	153	8.0	8.01	0.01	0.1092
A+B :	153	40.0	39.90	-0.10	0.3238
A-B :	153	24.0	23.87	-0.13	0.2413
C :	153	2.0	2.03	0.03	0.0521
B+C :	153	10.0	10.04	0.04	0.1494
B-C :	153	6.0	5.99	-0.01	0.0834

s.d.(AB) S(between runs): 0.20 Sw(within run): 0.17 S/Sw: 1.2

s.d.(BC) S(between runs): 0.09 Sw(within run): 0.06 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

38.8	-	41.2	for	A+B
23.1	-	24.9	for	A-B
9.60	-	10.4	for	B+C
5.70	-	6.30	for	B-C

DUPLICATES:

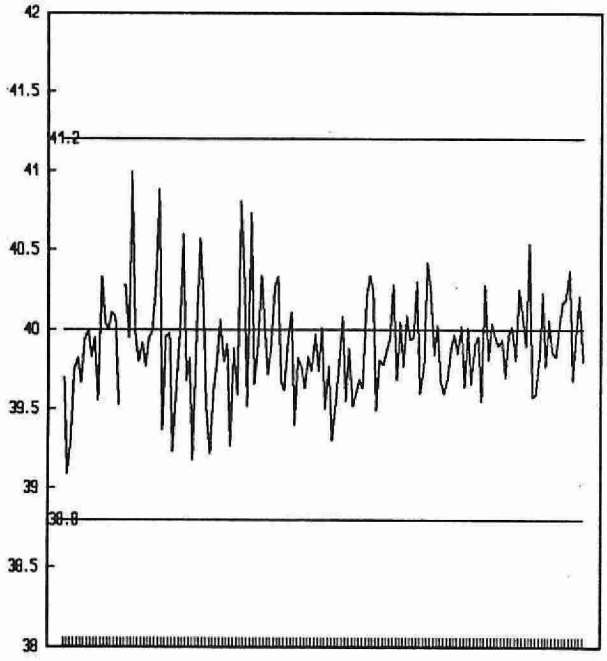
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
56	0.00	-	2.00	0.0374	3.8
53	2.00	-	5.00	0.0582	1.8
171	5.00	-	20.00	0.1923	1.9
147	20.00	-	40.00	0.4872	1.5
427	Overall			0.2284	

OTHER CHECKS:

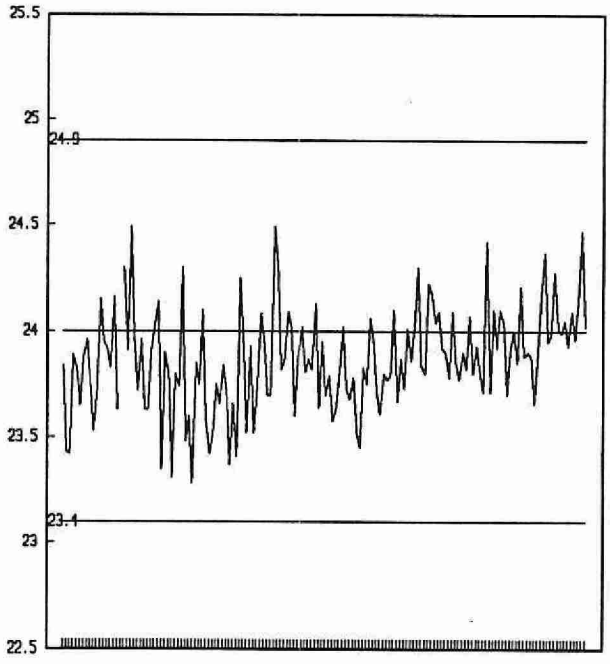
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	154	0.0059	0.0189

CALCIUM (mg/L as Ca)

QUALITY CONTROL DATA FROM 09/01/92 TO 30/12/92



QUALITY CONTROL STANDARD A+B



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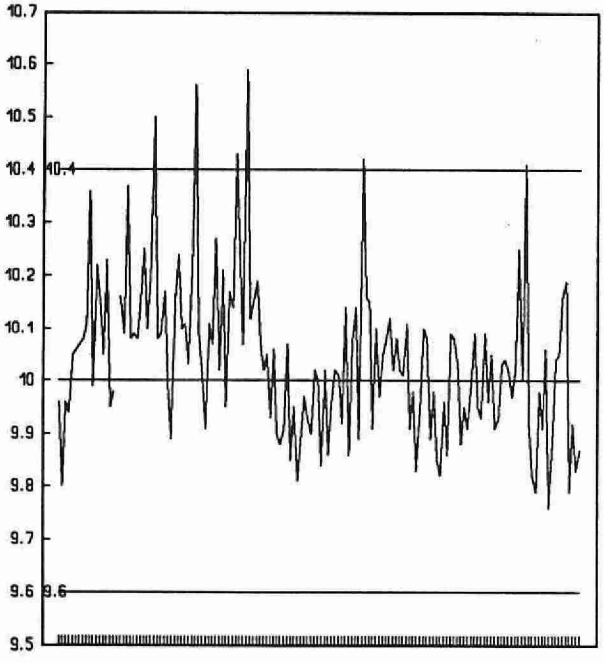

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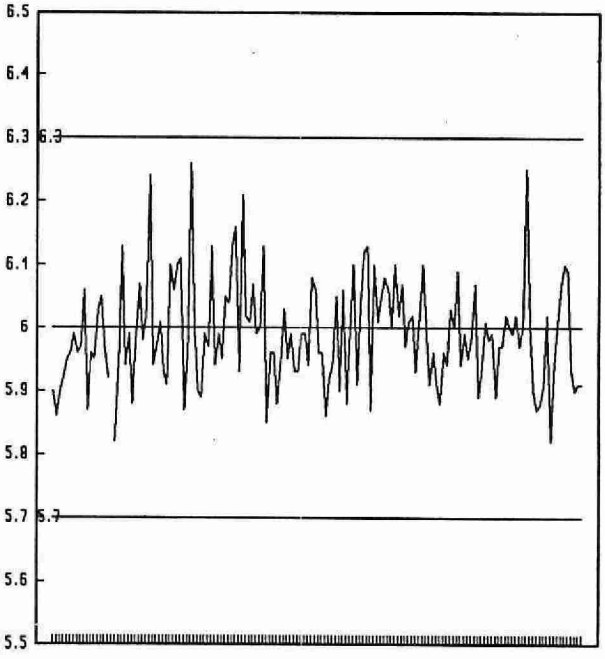


QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CALCIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: CAUR	Units	: mg/L as Ca
Work Station Code	: WAAS	Unit Code	: 064820
Method Code	: 002CA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage,Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 422.7 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.17 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

CALCIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92

Lab: Atomic Absorption Analytical Range: - to 200.0 mg/L as Ca

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	160	160.0	159.50	-0.50	1.816
B :	160	40.0	40.07	0.07	0.713
A+B :	160	200.0	199.57	-0.43	1.946
A-B :	160	120.0	119.43	-0.57	1.956
C :	160	10.0	9.98	-0.02	0.385
B+C :	160	50.0	50.05	0.05	0.898
B-C :	160	30.0	30.09	0.09	0.711

s.d.(AB) S(between runs): 1.38 Sw(within run): 1.38 S/Sw: 1.0

s.d.(BC) S(between runs): 0.57 Sw(within run): 0.50 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

190	-	210	for	A+B
113	-	127	for	A-B
44.5	-	54.5	for	B+C
27.0	-	33.0	for	B-C

DUPLICATES:

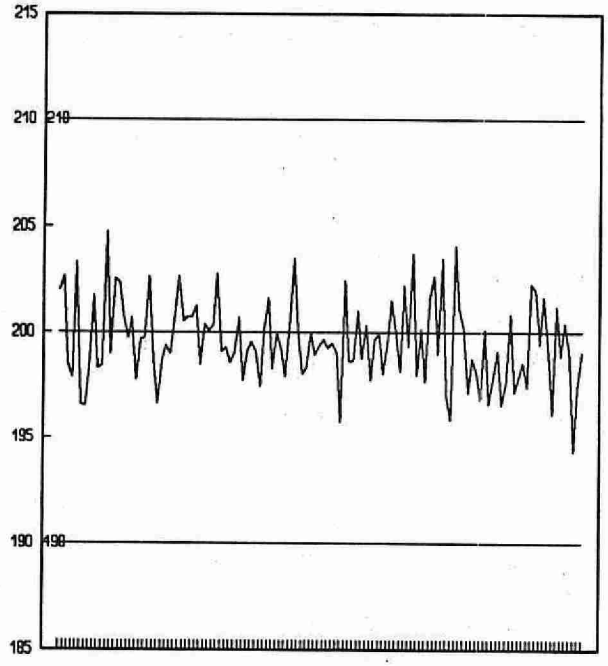
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
38	0.00	-	10.00	0.4362	9.3
21	10.00	-	20.00	0.4797	2.9
72	20.00	-	50.00	0.8216	2.0
112	50.00	-	100.00	1.4059	1.7
88	100.00	-	200.00	2.2344	1.9
331	Overall			1.3208	

OTHER CHECKS:

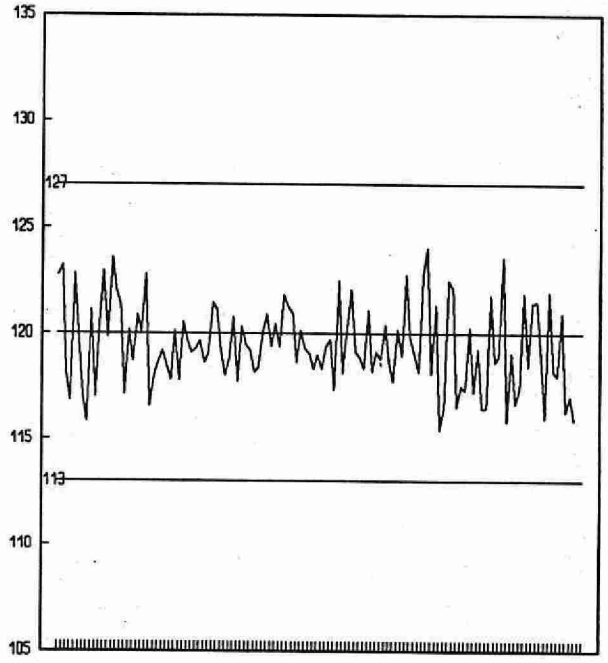
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	124	-0.4261	0.5590

CALCIUM (mg/L as Ca)

QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92



QUALITY CONTROL STANDARD A+B



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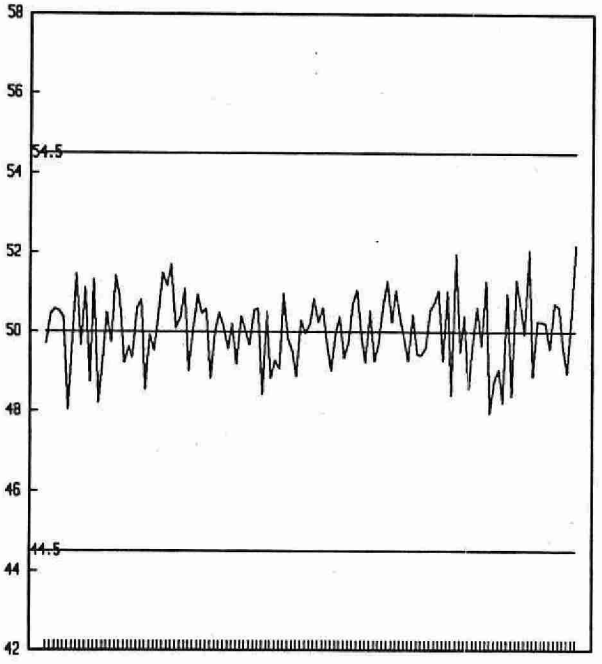
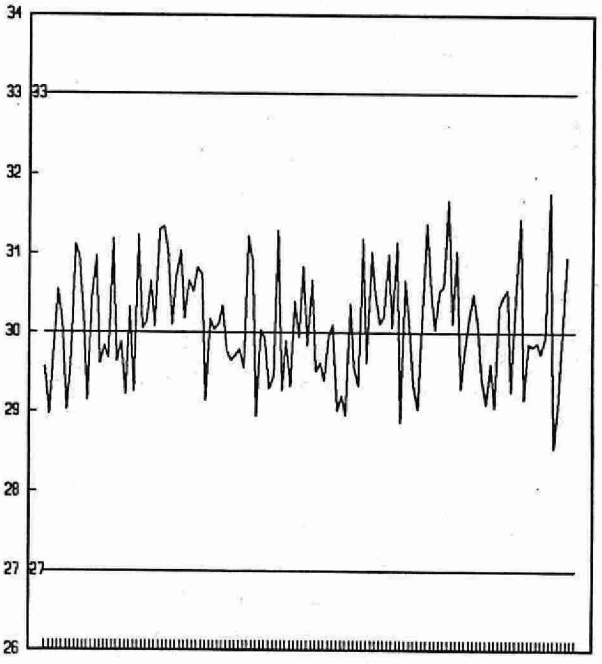


QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CARBON, DISSOLVED INORGANIC ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 03/06/80
LIS Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: DODIC	Unit Code	: 064806
Method Code	: 1127C2	Supervisor	: J. McBride
Method Reference No.	: E3028A		
Sample Type/Matrix	: Streams, Lakes, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.
Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO_2-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 9 standards daily

CONTROLS:

Calibration	: LTB plus 4 standards, e.g. QCA, QCB, QCC, QCD
Drift	: BL every 10 samples; BL plus 1 check standard every 20 samples

NOTES:

As concentrations of calibration control solutions slowly change with time at these low concentrations, calibration control ranges are based on long term measured averages rather than expected concentrations. This method was changed to incorporate DCI in Jan. 1989.

CARBON, DISSOLVED INORGANIC

QUALITY CONTROL DATA FROM 07/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 10.00 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	101	7.50	7.65	0.15	0.196
B :	101	2.25	2.26	0.01	0.083
A+B :	101	9.75	9.91	0.16	0.259
A-B :	101	5.25	5.38	0.13	0.155
C :	101	1.50	1.46	-0.04	0.057
D :	101	0.50	0.486	-0.014	0.042
C+D :	101	2.00	1.95	-0.05	0.090
C-D :	101	1.00	0.97	-0.03	0.044

s.d.(AB) S(between runs): 0.15 Sw(within run): 0.11 S/Sw: 1.4

s.d.(AB) S(between runs): 0.05 Sw(within run): 0.03 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.15	-	10.35	for	A+B
4.85	-	5.65	for	A-B
1.70	-	2.30	for	C+D
0.80	-	1.20	for	C-D

DUPLICATES:

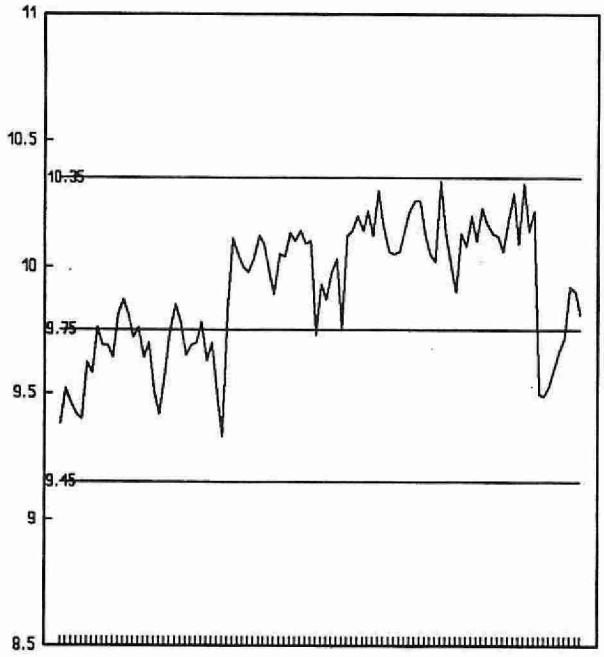
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
54	0.00	-	1.00	0.020	3.8
122	1.00	-	2.00	0.042	2.8
104	2.00	-	5.00	0.085	3.0
22	5.00	-	10.00	0.220	2.8
302	Overall			0.056	

OTHER CHECKS:

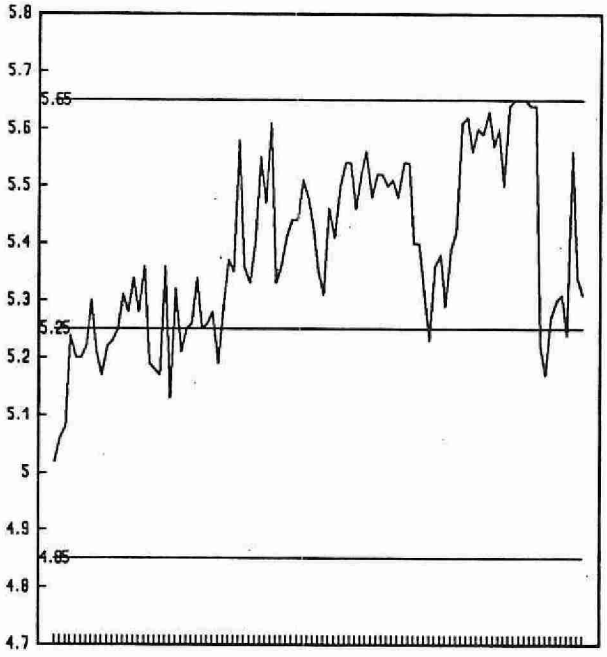
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	101	0.202	0.056

CARBON, DISSOLVED INORGANIC (mg/L as C)

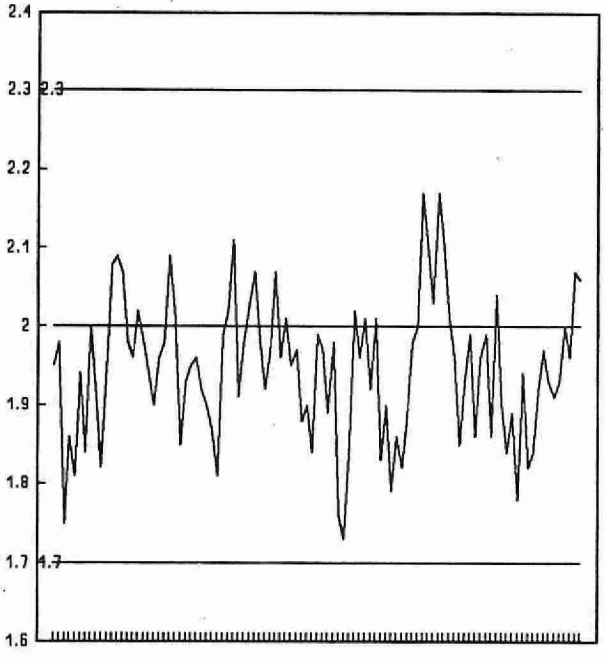
QUALITY CONTROL DATA FROM 07/01/92 TO 23/12/92



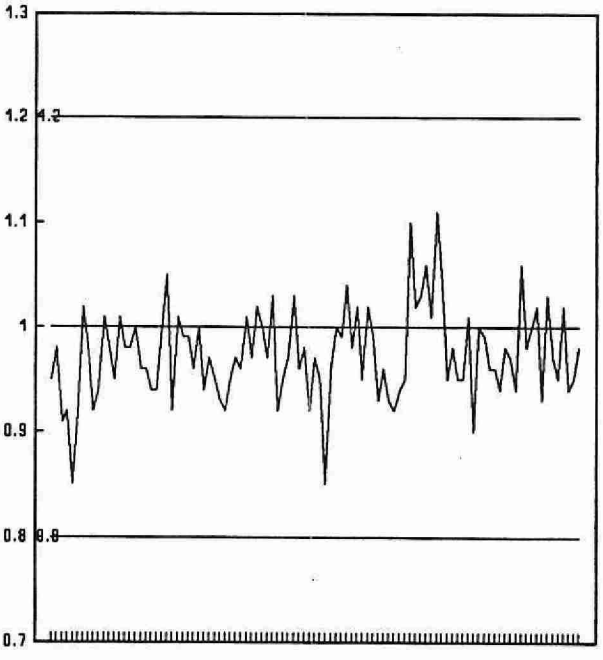
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** CARBON, DISSOLVED INORGANIC ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
Lis Test Name Code	: DIC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3178A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Dissolved inorganic carbon, which is determined colourimetrically on the supernatant of a settled sample, is converted to carbon dioxide gas by acidification. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved inorganic carbon content of the sample.
Approximate absorbance: 0.3 at the full scale level.
Dissolved organic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: air (CO_2-free) supply, dialysis unit. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

CARBON, DISSOLVED INORGANIC

QUALITY CONTROL DATA FROM 03/01/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 40.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	150	32	32.34	0.34	0.608
B :	150	8	8.13	0.13	0.247
A+B :	150	40	40.47	0.47	0.773
A-B :	150	24	24.22	0.22	0.514
C :	150	2	1.92	-0.08	0.178
B+C :	150	10	10.05	0.05	0.382
B-C :	150	6	6.21	0.21	0.198

s.d.(AB) S(between runs): 0.46 Sw(within run): 0.36 S/Sw: 1.3

s.d.(BC) S(between runs): 0.22 Sw(within run): 0.14 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

37.80	-	42.20	for	A+B
22.50	-	25.50	for	A-B
8.90	-	11.10	for	B+C
5.30	-	6.70	for	B-C

DUPLICATES:

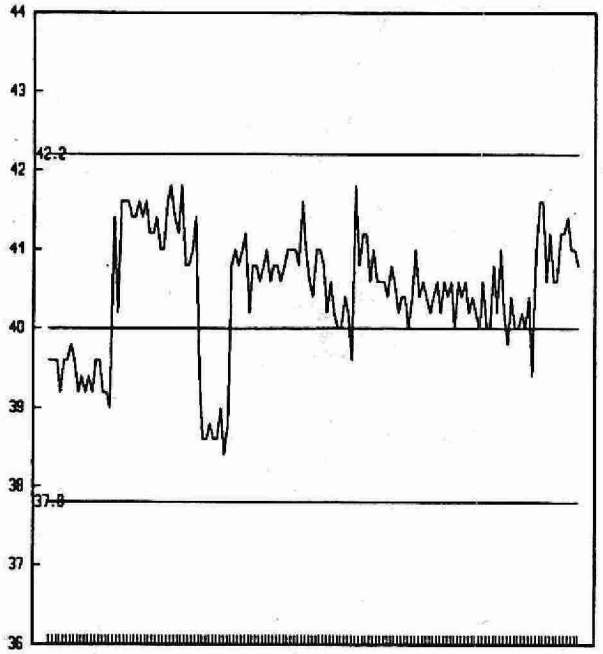
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
45	0.0	-	1.0	0.190	56.1
29	1.0	-	2.0	0.326	20.9
109	2.0	-	20.0	0.485	13.3
130	20.0	-	40.0	0.469	2.5
313		Overall		0.417	

OTHER CHECKS:

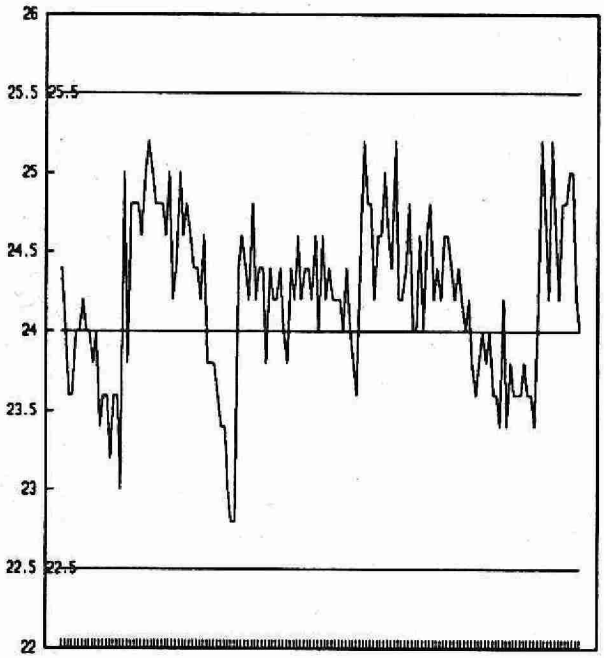
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	150	0.01467	0.137

CARBON, DISSOLVED INORGANIC (mg/L as C)

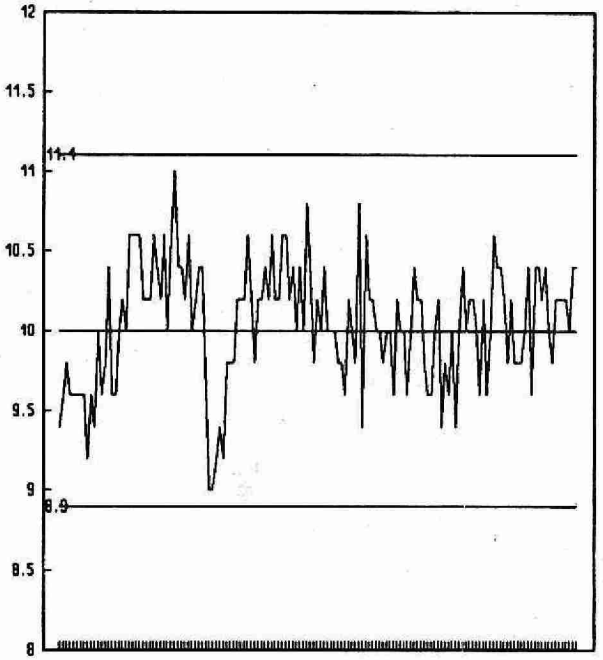
QUALITY CONTROL DATA FROM 03/01/92 TO 23/12/92



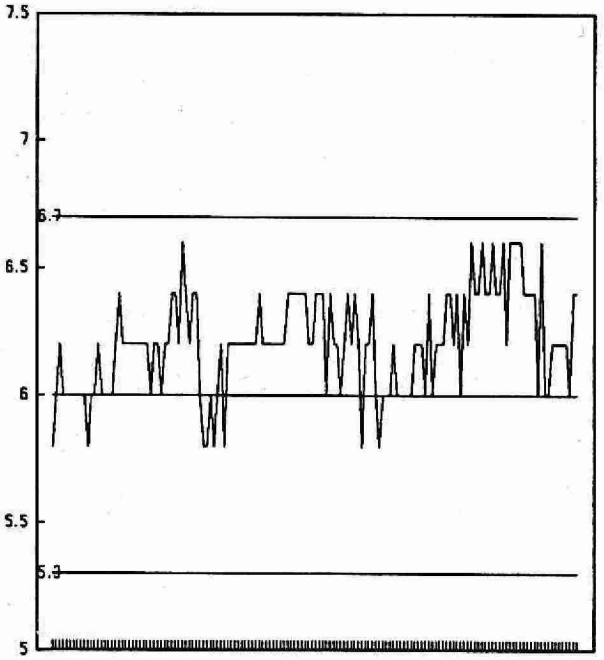
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CARBON, DISSOLVED ORGANIC ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: DOC	Units	: mg/L as C
Work Station Code	: ROM	Unit Code	: 064806
Method Code	: 102AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3178A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Using an automated system, the supernatant from a settled sample is acidified and flushed with nitrogen gas to remove inorganic carbon. Organic carbon is then oxidized to carbon dioxide gas by exposure to ultra-violet light (UV) in acid-persulphate media. The gas then passes through a gas-permeable membrane into a weakly-buffered alkaline phenolphthalein solution. The decrease in absorbance of this coloured solution is a measure of the dissolved organic carbon content of the sample.
Approximate absorbance: 0.3 at the full scale level.
Dissolved inorganic carbon, and reactive silicates are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: nitrogen and air (CO_2-free) supplies with flow controls, dialysis unit, UV digestor. Colourimetric measurement is through a 5.0 cm. light path at 550 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

CARBON, DISSOLVED ORGANIC

QUALITY CONTROL DATA FROM 03/01/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 20.0 mg/L as C

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	154	16.0	15.99	-0.01	0.124
B :	154	4.0	3.95	-0.05	0.097
A+B :	154	20.0	19.94	-0.06	0.182
A-B :	154	12.0	12.04	0.04	0.129
C :	154	1.0	0.98	-0.02	0.077
B+C :	154	5.0	4.93	-0.07	0.147
B-C :	154	3.0	2.97	-0.03	0.081

s.d.(AB) S(between runs): 0.11 Sw(within run): 0.09 S/Sw: 1.2

s.d.(BC) S(between runs): 0.09 Sw(within run): 0.07 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.30	-	20.70	for	A+B
11.50	-	12.50	for	A-B
4.60	-	5.40	for	B+C
2.76	-	3.24	for	B-C

DUPLICATES:

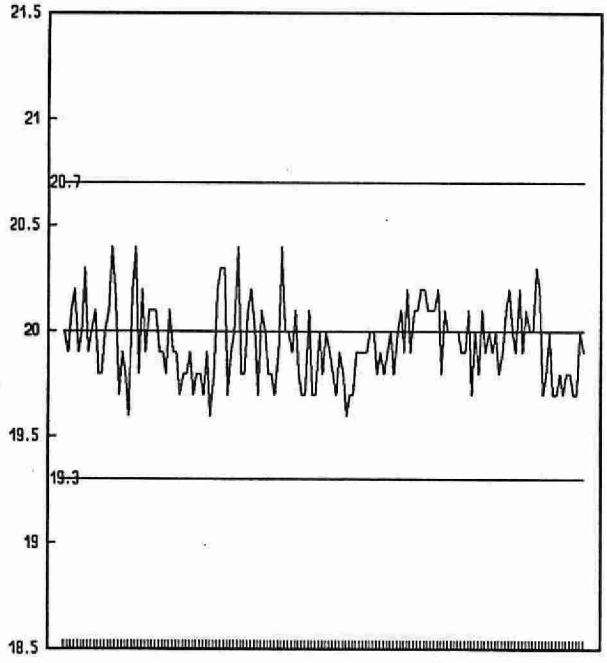
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
155	0.00	-	2.00	0.116	25.0
135	2.00	-	4.00	0.132	7.6
131	4.00	-	10.00	0.162	5.5
27	10.00	-	20.00	0.279	2.3
448	Overall			0.140	

OTHER CHECKS:

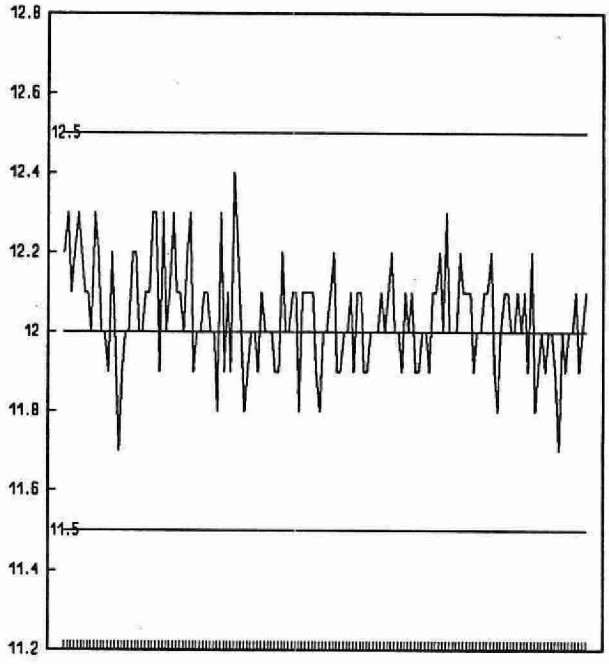
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	154	0.031	0.081

CARBON, DISSOLVED ORGANIC (mg/L as C)

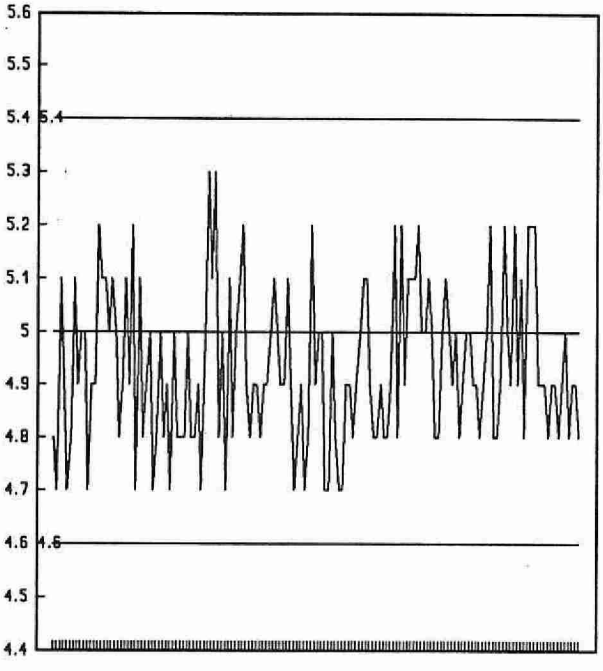
QUALITY CONTROL DATA FROM 03/01/92 TO 23/12/92



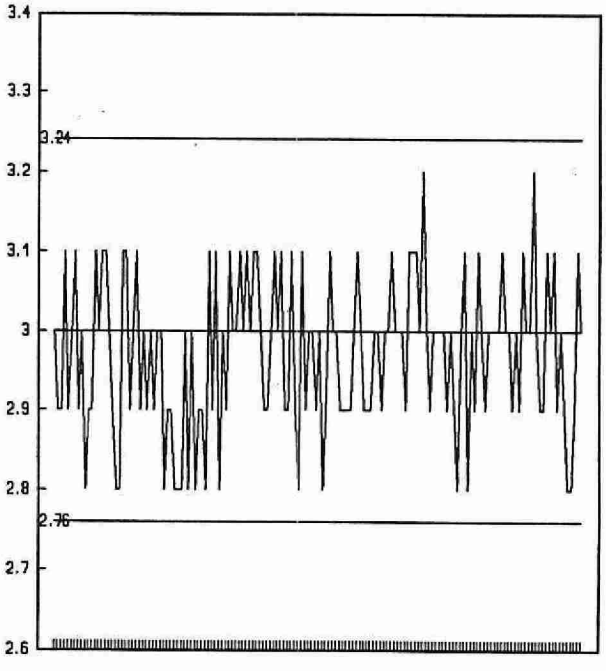
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CARBON, TOTAL ORGANIC ***

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 01/05/89
LIS Test Name Code	: TOC	Units	: mg/L as C
Work Station Code	: WAC	Unit Code	: 064000
Method Code	: SUM001	Supervisor	: J. McBride
Method Reference No.	: E3247A		
Sample Type/Matrix	: Industrial Effluents, and Sewage		

SAMPLING:

Quantity Required	: 500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

If particles in the sample are greater than about 2 mm diameter the sample is homogenized. An aliquot up to 100mL is acidified with sulphuric acid to pH 2.0, then bubbled with nitrogen gas for 10 minutes to remove inorganic carbon. The aliquot is then filtered through a 47 mm diameter glass fibre filter (particle size retention nominally 1.5 um). The filtrate is analyzed in an automated system, using ultra-violet/persulphate digestion with infra-red detection of carbon dioxide, to obtain the manually-acidified dissolved organic carbon (ADOC) result. The filter is dried at 103°C overnight and ignited at 1370°C in a Leco carbon analyzer to obtain the non-dissolved organic carbon (NDOC) result. The sum of ADOC and NDOC provides the TOC result.

INSTRUMENTATION:

Astro 2001 carbon analyzer with autosampler
Leco CR12 carbon analyzer

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

A solution of potassium biphthalate is used to calibrate the ADOC analyzer.
Powdered potassium biphthalate standards are used to calibrate the NDOC analyzer.

CONTROLS:

Calibration:	ADOC: 4 QC solutions
	NDOC: 2 powdered standards
Blanks:	ADOC: Untreated acidified distilled deionized water (LTB) and method blank
	NDOC: Unused filters and method blank filters are used
Drift:	Standard every 10 crucibles in Leco or every 10 tubes in auto-sampler
Matrix:	Repeat sample diluted 50% further at least every 10 samples
	Spiked sample at least every 10 samples
Precision:	Duplicate sample at least every 10 samples

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 03/01/92 TO 31/08/92

Lab: MISA Analytical Range: - to 50 mg/L as C

CALIBRATION CONTROL: ADOC

ADOC	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	44	40.0	40.21	0.21	0.7933
B :	44	10.0	9.30	-0.70	0.6256
A+B :	44	50.0	49.49	-0.51	0.9775
A-B :	44	30.0	30.89	0.89	0.9776

ADOC

s.d.(AB) S(between runs): 0.71 Sw(within run): 0.69 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

ADOC

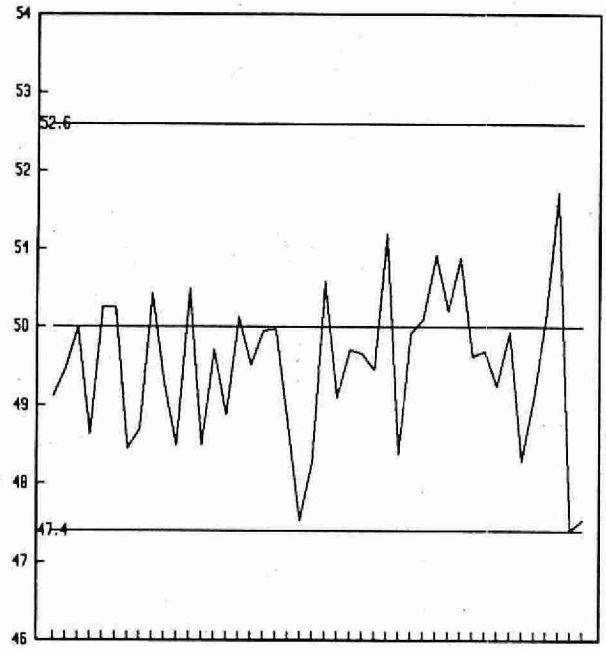
47.4	-	52.6	for	A+B
27.9	-	32.1	for	A-B

OTHER CHECKS:

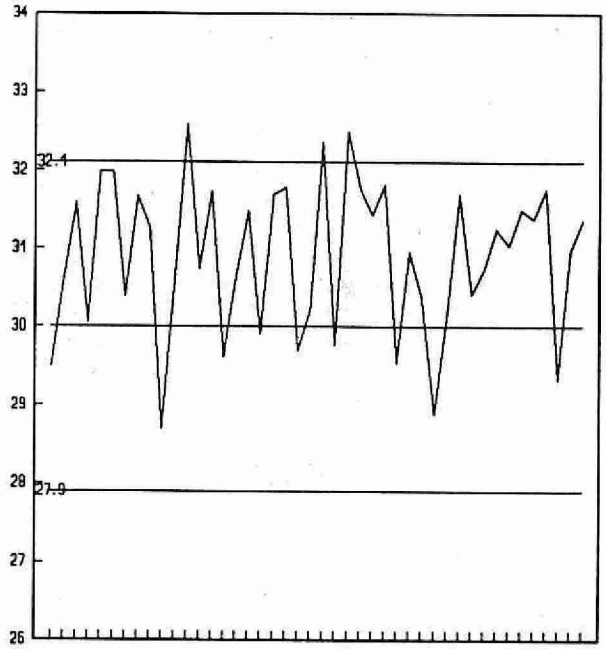
	Number of Data	Data Mean	Standard(1) Deviation
ADOC: MTD BLK	44	0.1177	0.3471
LTB	44	0.0000	0.0000

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 03/01/92 TO 31/08/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

———— CONTROL LIMIT

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 03/01/92 TO 22/12/92

Lab: MISA Analytical Range: - to 10 mg/L as C

CALIBRATION CONTROL: ADOC

ADOC	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
C :	92	8.0	8.09	0.09	0.2867
D :	92	2.0	2.09	0.09	0.2367
C+D :	92	10.0	10.18	0.18	0.4369
C-D :	92	6.0	5.98	-0.02	0.2828

ADOC

s.d.(AB) S(between runs): 0.26 Sw(within run): 0.20 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

ADOC

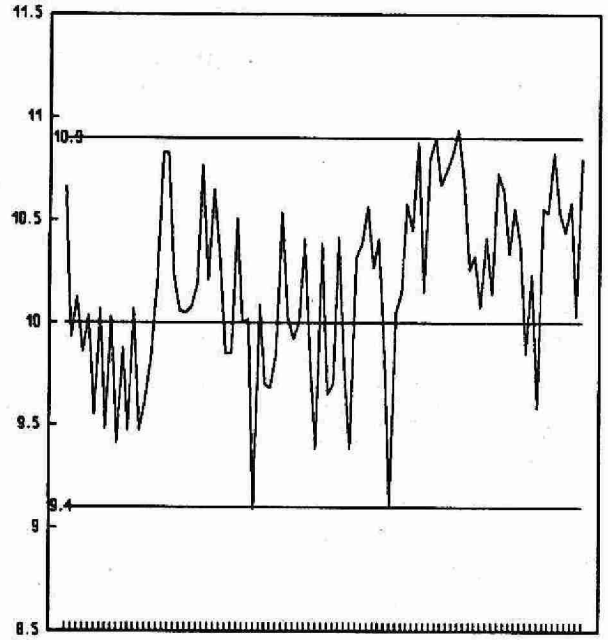
9.1	-	10.9	for	C+D
5.4	-	6.6	for	C-D

OTHER CHECKS:

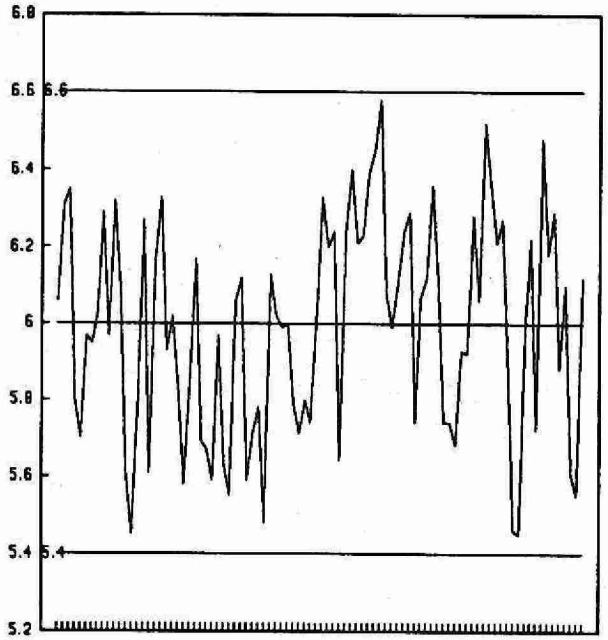
	Number of Data	Data Mean	Standard(1) Deviation
ADOC: LTB	92	0.1556	0.2513

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 03/01/92 TO 22/12/92



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

CARBON, TOTAL ORGANIC

QUALITY CONTROL DATA FROM 03/01/92 TO 22/12/92

CALIBRATION CONTROL: NDOC

NDOC	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	51	32.0	33.55	1.55	1.3968
B :	51	12.0	12.05	0.05	0.5488
A+B :	51	44.0	45.53	1.53	1.6520
A-B :	51	20.0	21.43	1.43	1.5299

NDOC

s.d.(AB) S(between runs): 1.06 Sw(within run): 1.08 S/Sw: 0.98

NDOC

40	-	48	for	A+B
17	-	23	for	A-B

OTHER CHECKS:

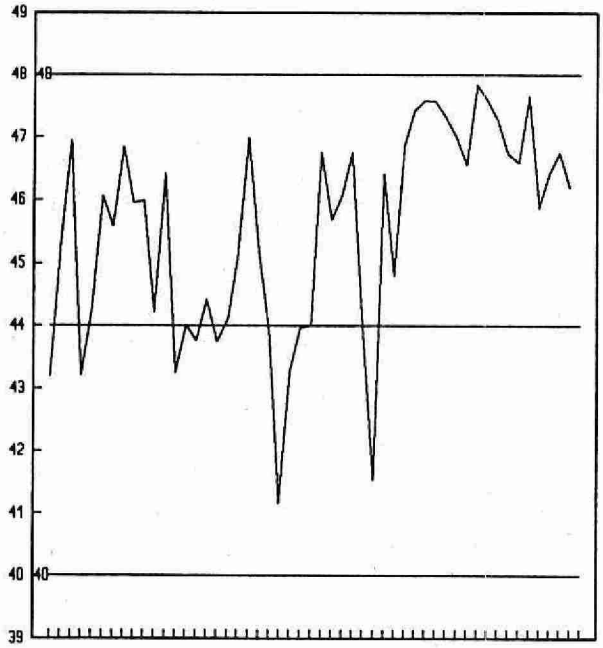
	Number of Data	Data Mean	Standard(1) Deviation
NDOC: MTD BLK	51	0.0425	0.0956
NDOC: BLK	51	0.0045	0.0185

DUPLICATES:

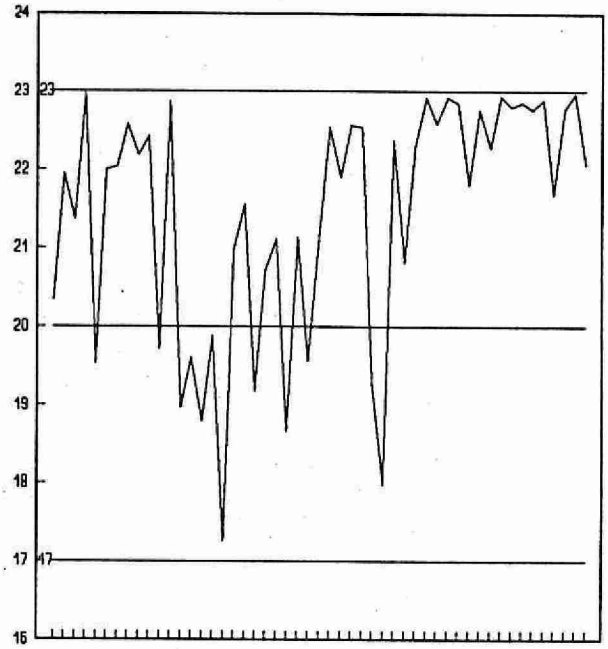
TOC	Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
	201	0.0	-	5.0	0.4382	27.2
	136	5.0	-	10.0	0.9245	15.4
	117	10.0	-	50.0	1.8407	10.7
	23	50.0	-	100.0	3.3804	6.9
	31	100.0	-	500.0	14.4341	13.9
	18	500.0	-	5000.0	85.2986	5.1
	526	Overall			1.2190	

CARBON, TOTAL ORGANIC (mg/L as C)

QUALITY CONTROL DATA FROM 03/01/92 TO 22/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/75
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: COCL	Unit Code	: 064960
Method Code	: 004BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3016A		
Sample Type/Matrix	: Rivers (non-APIOS), Lakes (non-APIOS), Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewages, Industrial Wastes		

SAMPLING:

Quantity Required	: 10 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Chloride ions are combined with mercuric thiocyanate releasing thiocyanate quantitatively. Thiocyanate then reacts with ferric ions to produce ferric thiocyanate (red), and the absorbance of the latter is measured colourimetrically.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 1.5 cm light path at 470nm.

Data capture, reduction, and processing via a multistage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

CHLORIDE

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 100 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	158	75.0	75.30	0.30	0.304
B :	158	25.0	25.13	0.13	0.141
A+B :	158	100.0	100.42	0.42	0.342
A-B :	158	50.0	50.17	0.17	0.328
C :	158	5.0	5.01	0.01	0.119
B+C :	158	30.0	30.14	0.14	0.212
B-C :	158	20.0	20.11	0.11	0.152

s.d.(AB) S(between runs): 0.24 Sw(within run): 0.23 S/Sw: 1.02

s.d.(BC) S(between runs): 0.13 Sw(within run): 0.11 S/Sw: 1.21

On any given day the calibration is accepted if the values obtained lie within the ranges:

98.7	-	101.3	for	A+B
49.0	-	51.0	for	A-B
29.3	-	30.7	for	B+C
19.5	-	20.5	for	B-C

DUPLICATES:

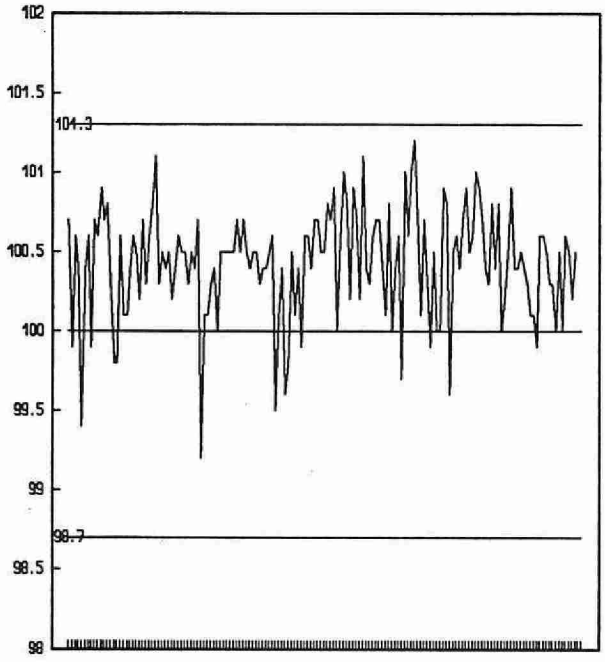
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
50	0.0	-	5.0	0.114	6.5
206	5.0	-	25.0	0.156	2.1
160	25.0	-	100.0	0.342	4.1
416	Overall			0.213	

OTHER CHECKS:

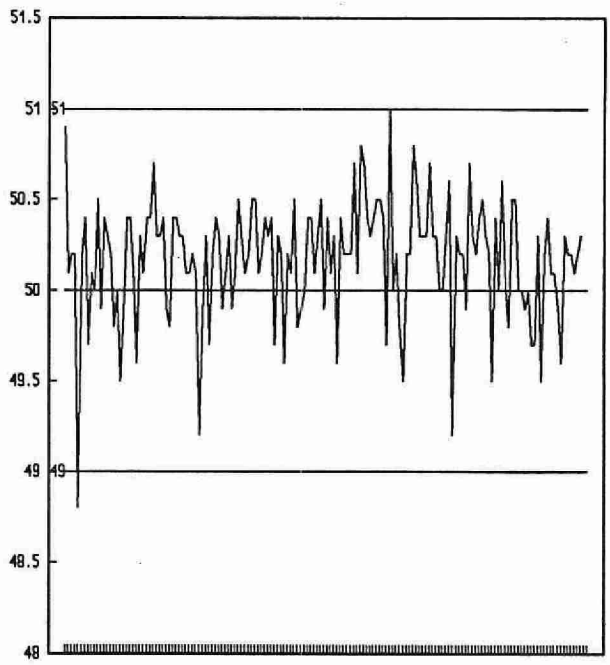
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	158	-0.038	0.129

CHLORIDE (mg/L as Cl)

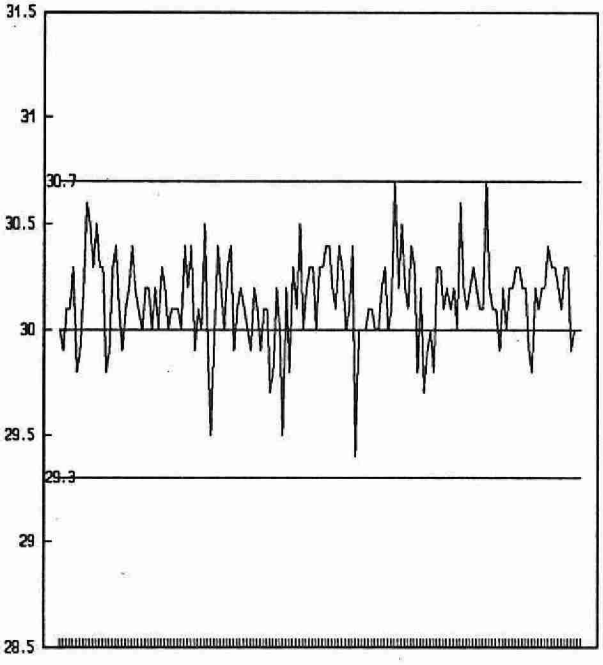
QUALITY CONTROL DATA FROM 02/01/92 TO 13/12/92



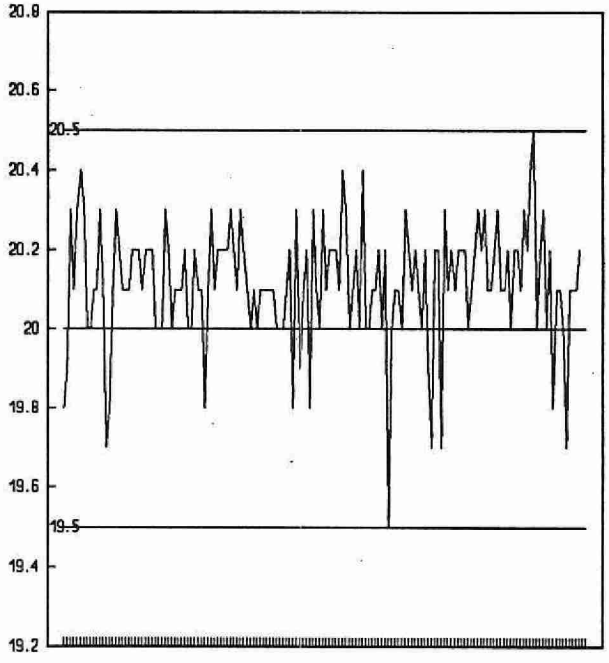
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: mg/L as Cl
Work Station Code	: PRIC1	Unit Code	: 064960
Method Code	: 005AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards.

Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Two analytical ranges are in operation at this work station, and subsequently, quality control results are provided for each range.

CHLORIDE

QUALITY CONTROL DATA FROM 16/01/92 TO 21/12/92

Lab: Ion Chromatography Analytical Range: - to 1.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	34	0.8	0.811	0.011	0.017
B :	34	0.2	0.202	0.002	0.010
A+B :	34	1.0	1.014	0.014	0.023
A-B :	34	0.6	0.609	0.009	0.014

s.d.(AB) S(between runs): 0.013 Sw(within run): 0.010 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95	-	1.05	for	A+B
0.57	-	0.63	for	A-B

DUPLICATES:

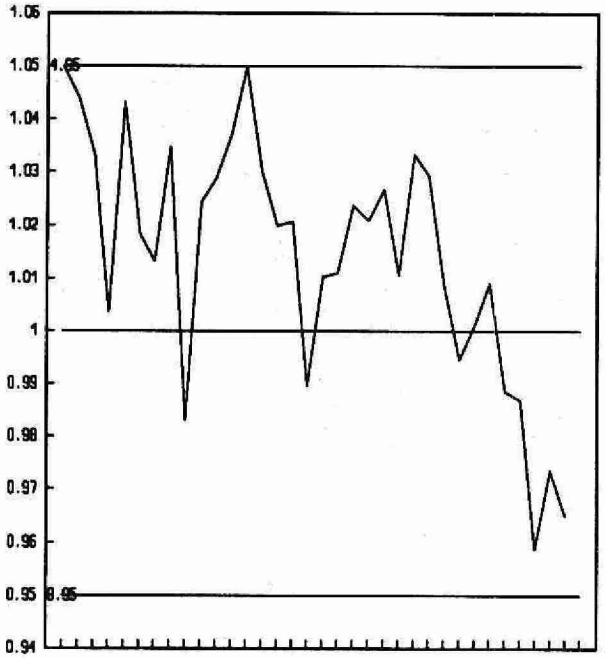
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
23	0.00	-	0.05	0.0016	20.7
25	0.05	-	0.10	0.0037	6.6
42	0.10	-	1.00	0.0039	2.2
90	Overall			0.0032	

OTHER CHECKS:

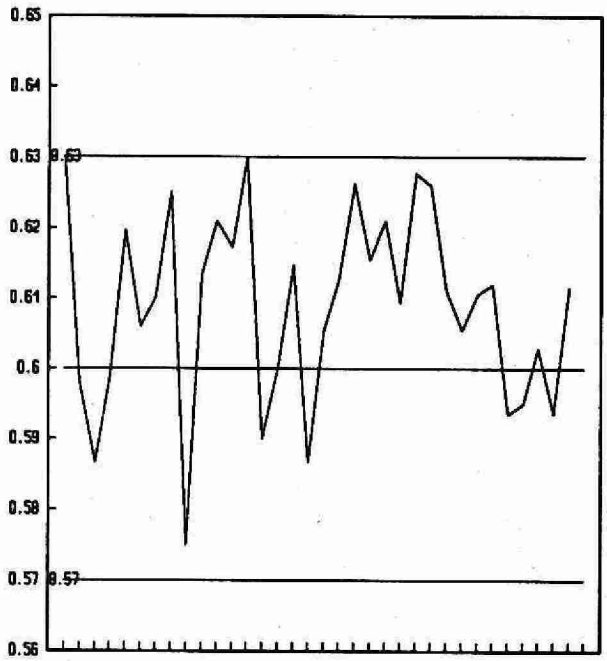
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	34	0.0005	0.002

CHLORIDE (mg/L as Cl)

QUALITY CONTROL DATA FROM 16/01/92 TO 21/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

CHLORIDE

QUALITY CONTROL DATA FROM 06/01/92 TO 24/12/92

Lab: Ion Chromatography Analytical Range: - to 2.0 mg/L as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	72	1.60	1.609	0.009	0.0115
B :	72	0.40	0.402	0.002	0.0101
A+B :	72	2.00	2.010	0.010	0.0191
A-B :	72	1.20	1.207	0.007	0.0103

s.d.(AB) S(between runs): 0.011 Sw(within run): 0.007 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.92	-	2.08	for	A+B
1.14	-	1.26	for	A-B

DUPLICATES:

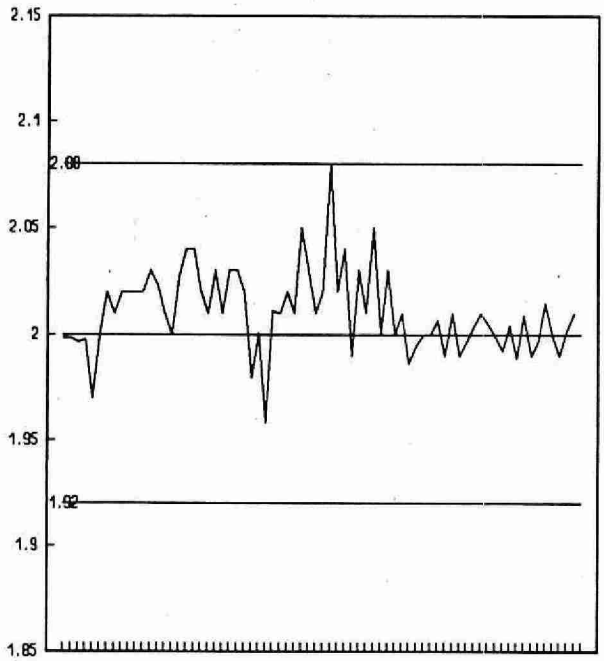
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
102	0.00	-	0.50	0.0096	3.7
32	0.50	-	1.00	0.0097	1.4
14	1.00	-	2.00	0.0187	1.3
148	Overall			0.0106	

OTHER CHECKS:

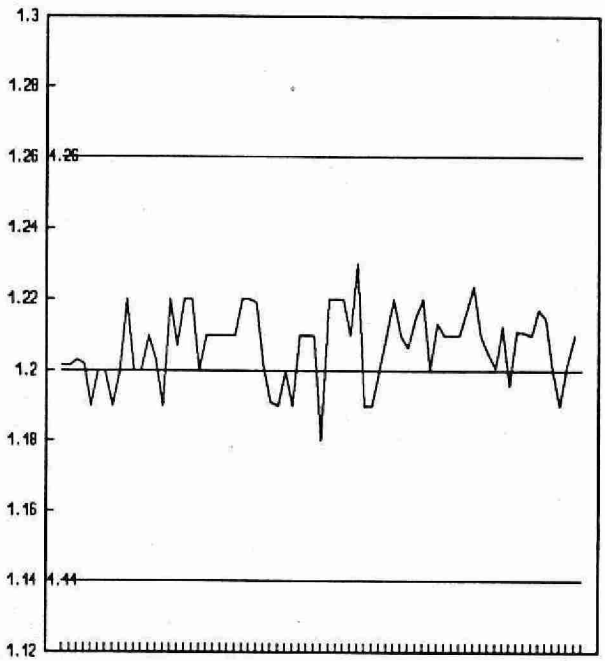
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	72	0.0007	0.003

CHLORIDE (mg/L as Cl)

QUALITY CONTROL DATA FROM 06/01/92 TO 24/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** CHLORIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: CLIDUR	Units	: µg/Filter as Cl
Work Station Code	: PRLOV	Unit Code	: 361960
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Chloride is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with Na_2CO_3/$NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of chloride in mg/L as Cl is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as Cl.
Nitrogen-nitrate and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

CHLORIDE

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 100 µg/filter as Cl

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	58	80.0	79.41	-0.59	1.011
B :	58	20.0	20.44	0.56	0.831
A+B :	58	100.0	99.86	-0.14	1.555
A-B :	58	60.0	58.97	-0.13	1.004

s.d.(AB) S(between runs): 0.93 Sw(within run): 0.71 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.5	-	103.5	for	A+B
57.5	-	62.5	for	A-B

DUPLICATES:

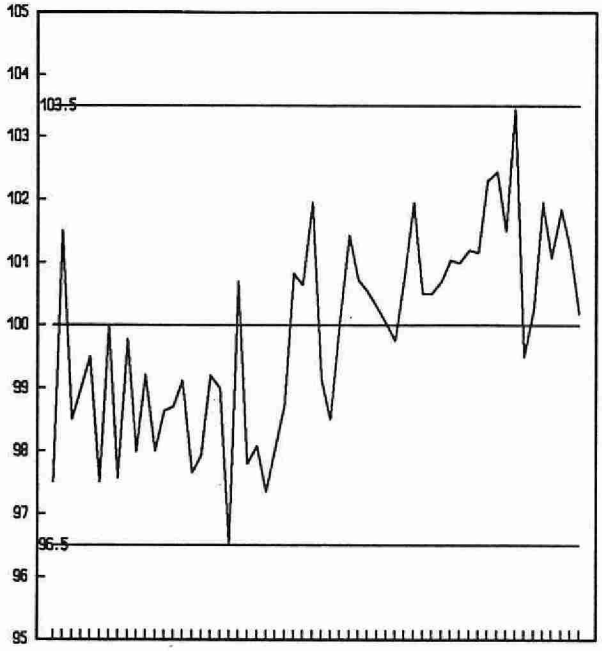
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
17	0.0	-	10.0	0.159	1.9
19	10.0	-	20.0	0.147	1.9
13	20.0	-	50.0	0.321	1.3
2	50.0	-	100.0	N.A.	N.A.
51		Overall		0.221	

OTHER CHECKS:

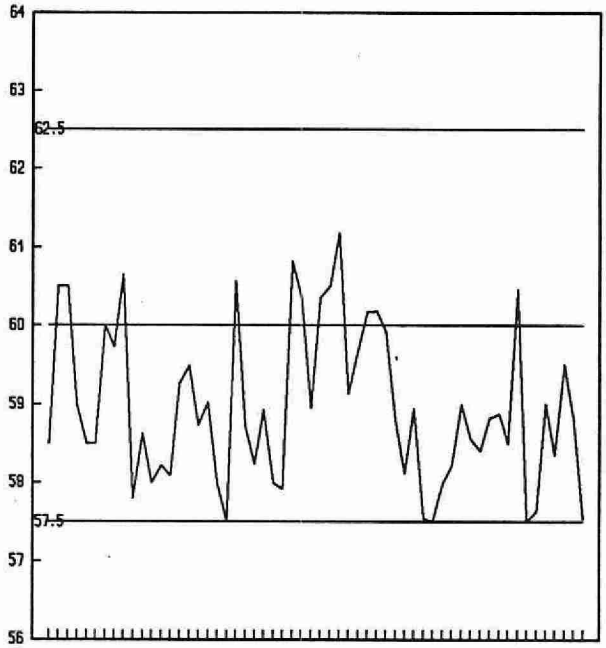
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	58	0.052	0.202

CHLORIDE (µg/filter as Cl)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

———— CONTROL LIMIT

*** COLOUR, TRUE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 15/10/80
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: DOCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: J. McBride
Method Reference No.	: E3025A		
Sample Type/Matrix	: Streams, Lakes		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured on a settled sample colourimetrically in a system calibrated with acidified chloroplatinate standards. Colour is measured using a 400-450 nm broadband blue filter. Approximate absorbance: 0.20 at the full scale level.

INSTRUMENTATION:

One colourimeter with broadband blue filter (400-450 nm)
One autosampler and chart-recorder
One Gilson pump

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

: 6 acidified chloroplatinate standards, 10, 20, 40, 60, 80, 100 TCU

CONTROLS:

Calibration : LTBL plus 3 standards, e.g. QCA, QCB, QCC

NOTES:

Slope factor is changed whenever light source in a colourimeter or cell is replaced. This is accomplished by analyzing 7 standards.

Work station was formerly DOCC and changed in January 1991 to DOCOL.

COLOUR, TRUE

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Dorset Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	46	75.0	75.43	0.43	0.469
B :	46	25.0	25.19	0.19	0.478
A+B :	46	100.0	100.63	0.63	0.811
A-B :	46	50.0	50.24	0.24	0.488
C :	46	5.0	5.4	0.40	0.399
B+C :	46	30.0	30.60	0.60	0.624
B-C :	46	20.0	19.80	-0.20	0.623

s.d.(AB) S(between runs): 0.47 Sw(within run): 0.34 S/Sw: 1.4

s.d.(CD) S(between runs): 0.44 Sw(within run): 0.44 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

96.70	-	103.30	for	A+B
47.50	-	52.50	for	A-B
27.70	-	32.30	for	C+D
18.20	-	21.80	for	C-D

DUPLICATES:

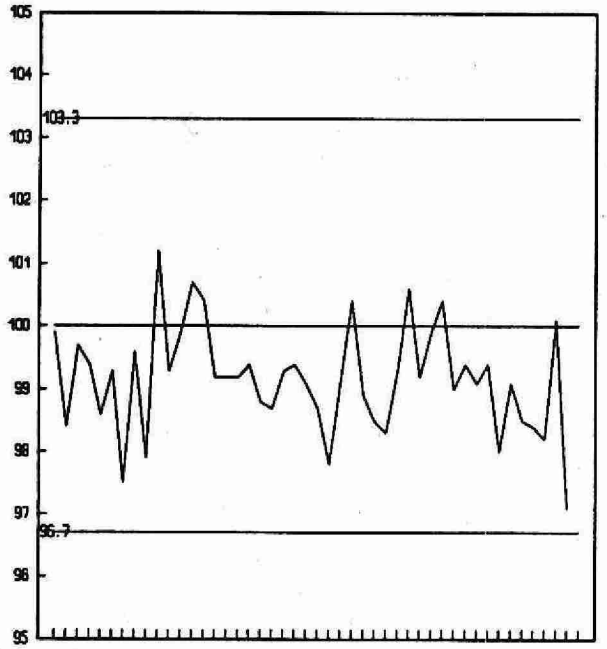
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
57	0.0	-	20.0	0.348	6.6
27	20.0	-	50.0	0.600	2.0
19	50.0	-	100.0	1.265	1.9
103	Overall			0.520	

OTHER CHECKS:

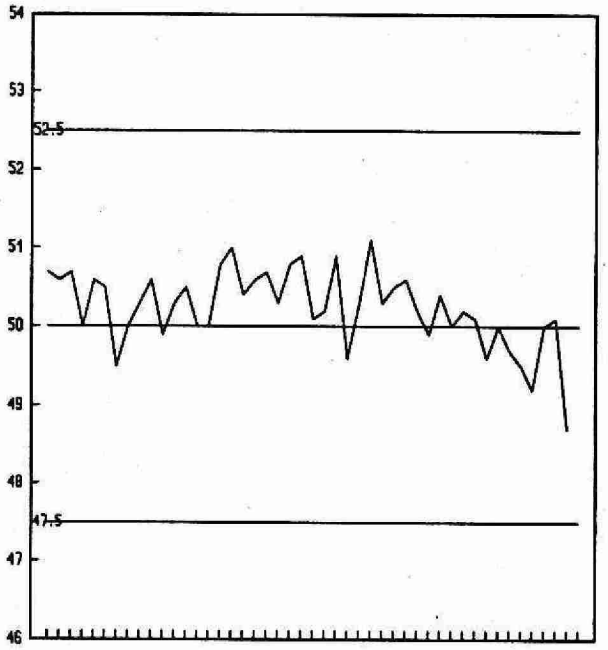
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	1.004	1.598

COLOUR, TRUE (TCU)

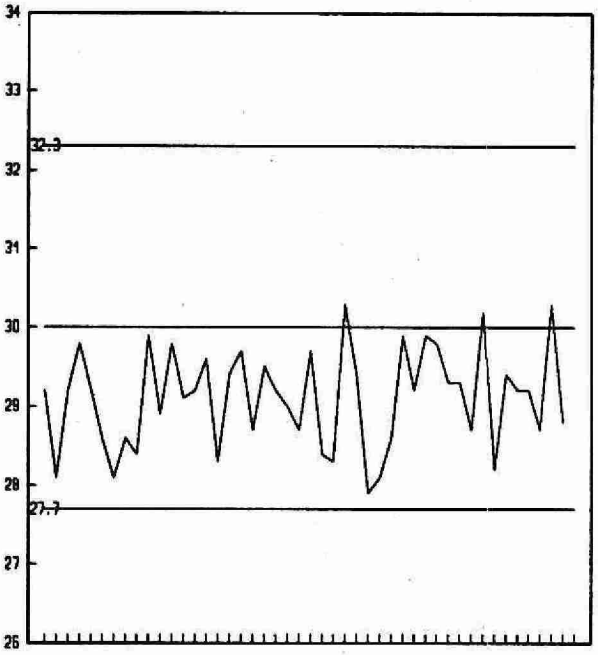
QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92



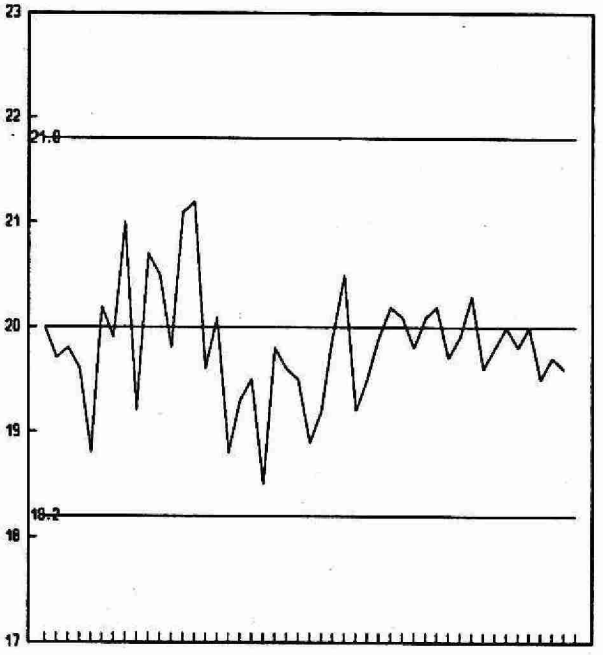
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** COLOUR, TRUE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 13/03/84
LIS Test Name Code	: COLTR	Units	: TCU
Work Station Code	: WCOL	Unit Code	: 340000
Method Code	: 102BC9	Supervisor	: M. Rawlings
Method Reference No.	: E3219A		
Sample Type/Matrix	: Domestic Waters, Effluents, Surface Waters, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

True colour is measured colourimetrically on the supernatant of a settled sample in a system calibrated with acidified chloroplatinate standards. The sample stream is measured using a broadband blue filter. Residual turbidity effects are suppressed by using a broadband red filter and increased path length in the reference stream.

Approximate absorbance: 0.3 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system. Colour measurement is through a 3.0 cm. light path using a broadband filter (400-450 nm). Turbidity measurement is through a 5.0 cm. light path using a different broadband filter (660-740 nm). Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

COLOUR, TRUE

QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92

Lab: Colourimetry Analytical Range: - to 100 TCU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	55	70.0	69.39	-0.61	0.642
B :	55	25.0	24.90	-0.10	0.280
A+B :	55	95.0	94.29	-0.71	0.778
A-B :	55	45.0	44.48	-0.52	0.612
C :	55	7.5	7.40	-0.10	0.214
B+C :	55	32.5	32.31	-0.19	0.402
B-C :	55	17.5	17.501	0.001	0.295

s.d.(AB) S(between runs): 0.49 Sw(within run): 0.43 S/Sw: 1.1

s.d.(BC) S(between runs): 0.25 Sw(within run): 0.21 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

92.2	-	97.8	for	A+B
42.9	-	47.1	for	A-B
30.6	-	34.3	for	B+C
16.1	-	18.9	for	B-C

DUPLICATES:

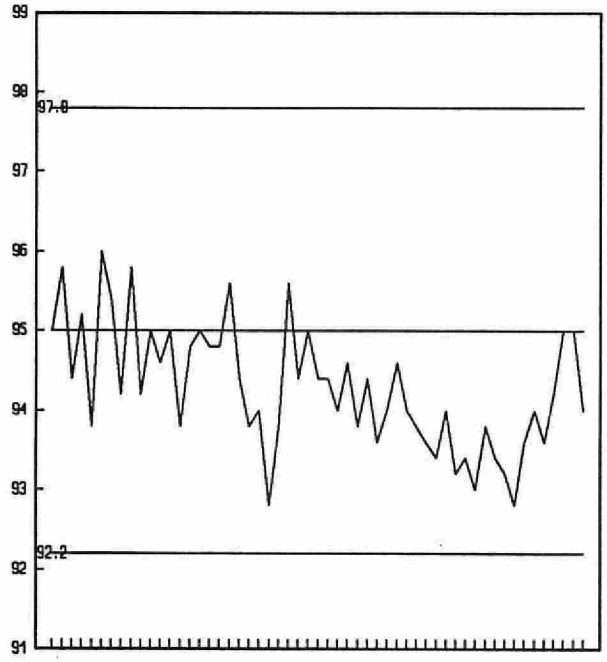
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
75	0.00	-	5.00	0.283	16.4
54	5.00	-	25.00	0.387	5.2
10	25.00	-	100.00	1.240	4.0
139	Overall			0.355	

OTHER CHECKS:

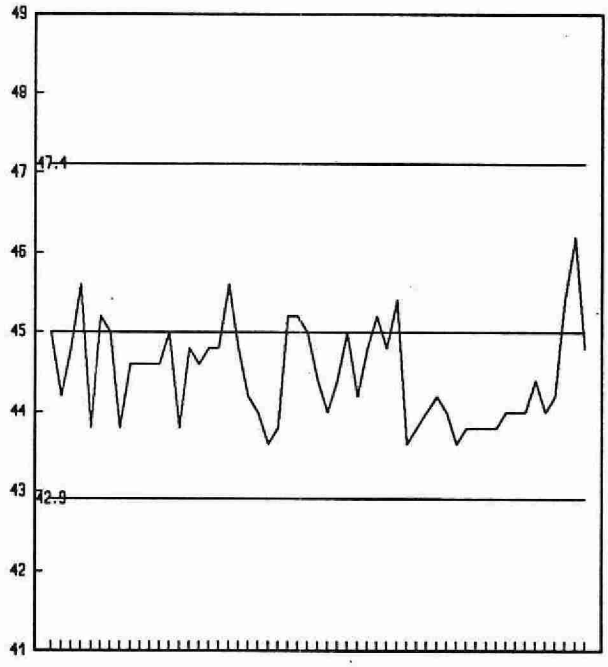
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	55	0.113	0.236

COLOUR, TRUE (TCU)

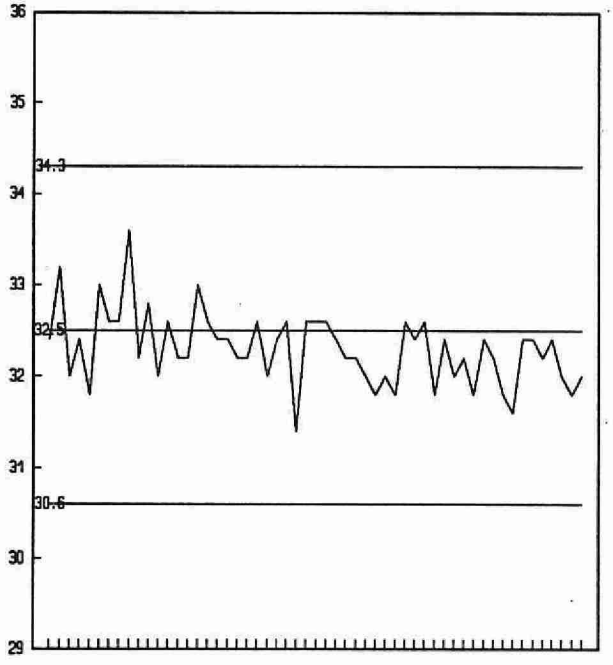
QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92



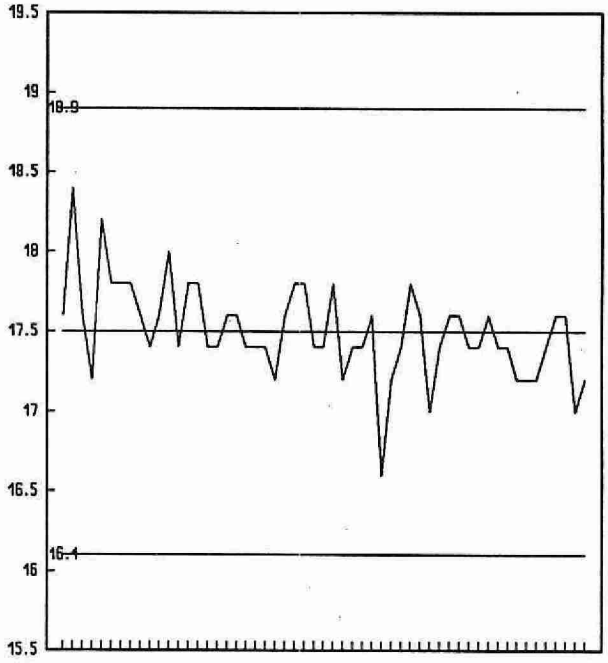
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: COND25	Units	: µS/cm at 25°C
Work Station Code	: DOCOND	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: J. McBride
Method Reference No.	: E3024A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, Soil Leachates		

SAMPLING:

Quantity Required	: 75 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The sample is introduced into a jacketed conductivity cell. The conductivity is calculated from the chart record.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator. One autosampler, Gilson pump and dual-range chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

: 5 KCl standards, 10.2, 30.6, 50.8, 101.1, 151 µS

CONTROLS:

Calibration : LTB plus 4 standards, e.g. QCA

NOTES:

The calibration and control standards are corrected for the LTB from which they are made.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 06/01/92 TO 18/12/92

Lab: Dorset

Analytical Range: - to 500 µS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	55	146.7	148.24	1.54	1.495
B :	55	51.8	53.09	1.29	0.577
A+B :	55	198.5	201.33	2.83	1.783
A-B :	55	94.9	95.15	0.25	1.397
C :	55	51.8	53.06	1.26	0.514
D :	55	14.9	15.77	0.87	0.556
C+D :	55	66.7	68.83	2.13	0.8851
C-D :	55	36.9	37.29	0.39	0.6022

s.d.(AB) S(between runs): 1.13 Sw(within run): 0.97 S/Sw: 1.1

s.d.(CD) S(between runs): 0.53 Sw(within run): 0.43 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

195	- 202	for	A+B
92.2	- 97.6	for	A-B
64.9	- 68.5	for	C+D
35.6	- 38.2	for	C-D

DUPLICATES:

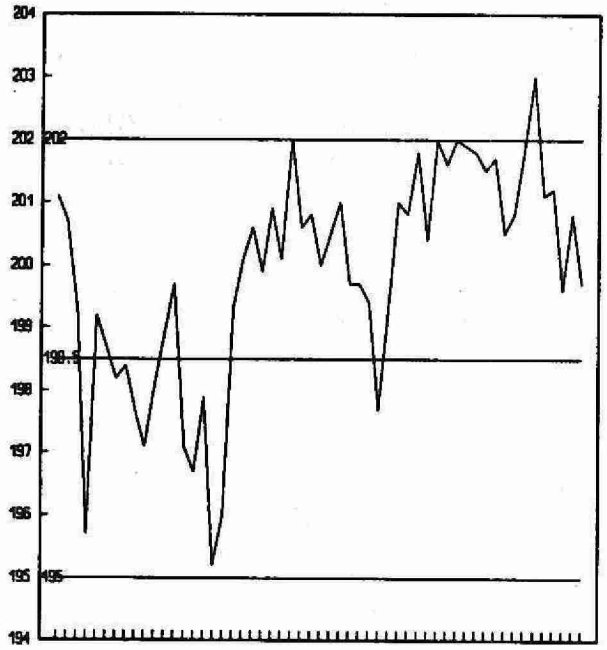
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
21	0.0	-	25.0	0.482	2.3
131	25.0	-	100.0	0.661	1.7
8	100.0	-	500.0	1.268	0.7
160	Overall			0.677	

OTHER CHECKS:

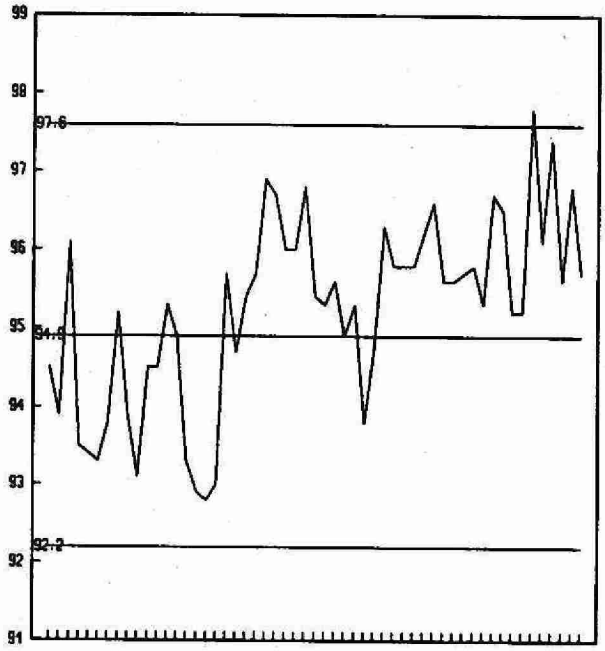
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	55	0.627	0.446

CONDUCTIVITY (µS/cm)

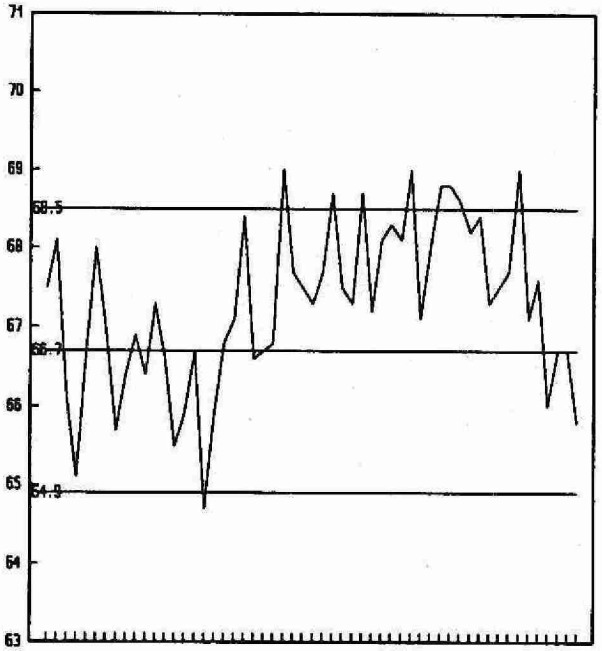
QUALITY CONTROL DATA FROM 06/01/92 TO 18/12/92



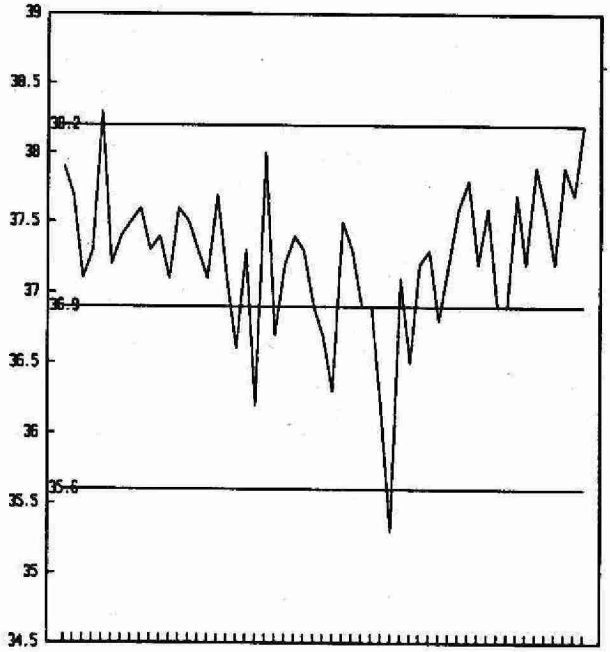
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: COND25	Units	: µS/cm at 25°C
Work Station Code	: PRCON	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Method Reference No.	: E3177A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, The conductivity of the sample is measured.

INSTRUMENTATION:

Automated modular continuous flow conductivity system comprised of sampler, water bath, conductivity meter with cell, chart recorder.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

1 standard

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 solution every 10 samples

NOTES:

A calibration standard for the ion chromatographic system is used to monitor the drift for the conductivity system, but its theoretical conductivity is unknown.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 07/01/92 TO 10/12/92

Lab: Ion Chromatography Analytical Range: - to 100.0 µS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	25	44.5	44.56	0.06	0.749
B :	25	7.5	8.16	0.66	0.473
A+B :	25	52.0	52.72	0.72	1.029
A-B :	25	37.0	36.40	-0.60	0.716

s.d.(AB) S(between runs): 0.63 Sw(within run): 0.51 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.76	-	56.24	for	A+B
33.82	-	40.18	for	A-B

DUPLICATES:

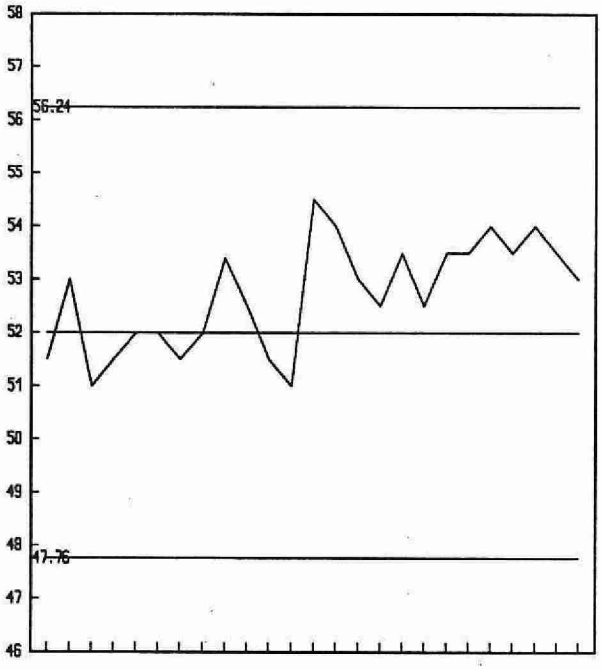
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
30	0.0	-	20.0	0.4012	3.0
39	20.0	-	50.0	0.6984	2.8
5	50.0	-	100.0	1.8371	2.6
74	Overall			0.6257	

OTHER CHECKS:

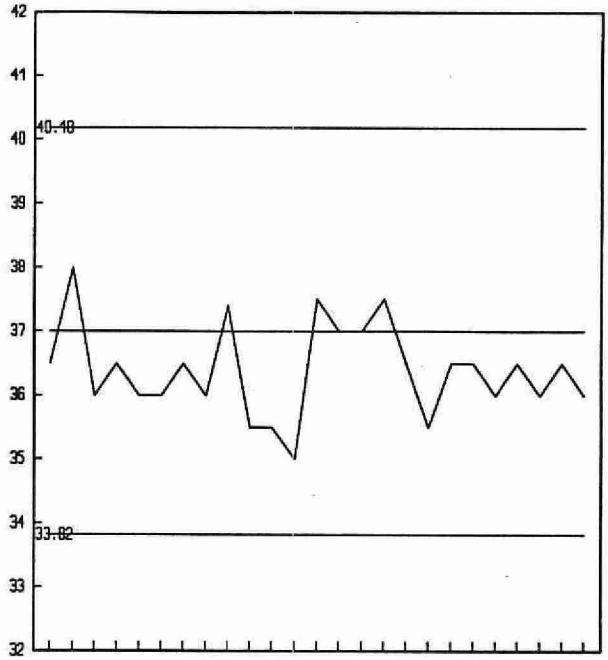
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	25	0.24	0.144

CONDUCTIVITY (µS/cm)

QUALITY CONTROL DATA FROM 07/01/92 TO 10/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: µS/cm at 25°C
Work Station Code	: RATS	Unit Code	: 350351
Method Code	: 002B12	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured.
pH, Gran alkalinity and total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CONTROLS:

Calibration	: BL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 20% V/V)

NOTES:

Quality Control limits were changed on April 9, 1992. QC data prior to this date were under the control of former limits.

CONDUCTIVITY

QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92

Lab: Titration Analytical Range: - to 2000 µS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	115	717.8	716.4	-1.4	1.983
B :	115	147.0	147.3	0.3	0.771
A+B :	115	864.8	863.8	-1.0	2.444
A-B :	115	570.8	569.1	-1.7	1.758
C :	115	37.1	38.0	0.9	0.376
B+C :	115	184.1	185.3	1.2	0.974
B-C :	115	109.9	109.4	-0.5	0.727

s.d.(AB) S(between runs): 1.50 Sw(within run): 1.24 S/Sw: 1.21

s.d.(BC) S(between runs): 0.61 Sw(within run): 0.51 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

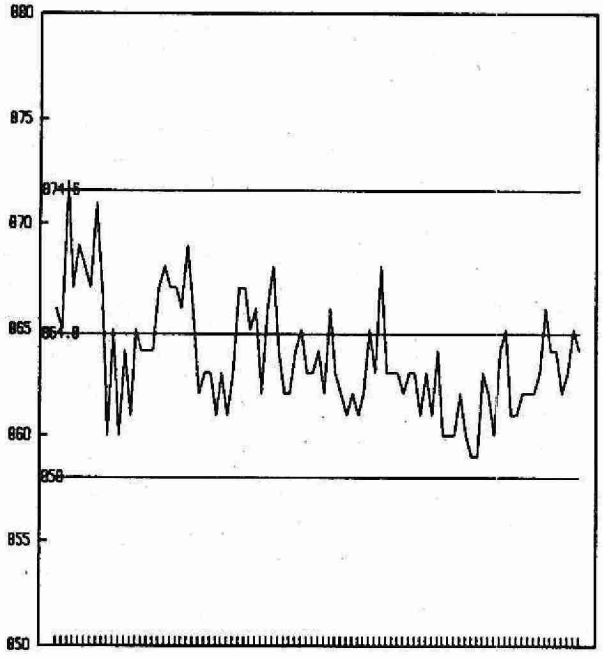
858	-	871.6	for	A+B
565.7	-	575.9	for	A-B
180.54	-	187.66	for	B+C
107.23	-	112.57	for	B-C

DUPLICATES:

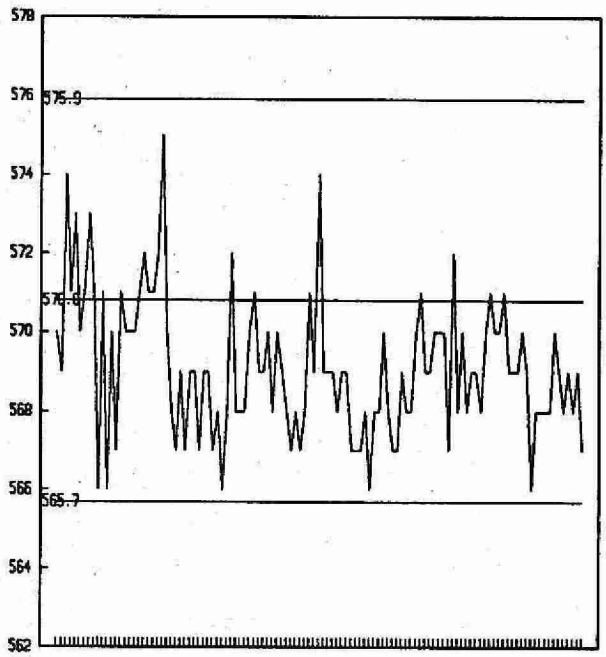
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
54	0	-	200	1.259	1.2
101	200	-	500	2.097	0.6
96	500	-	1000	2.363	0.4
15	1000	-	2000	9.891	0.7
266	Overall			2.171	

CONDUCTIVITY (µS/cm)

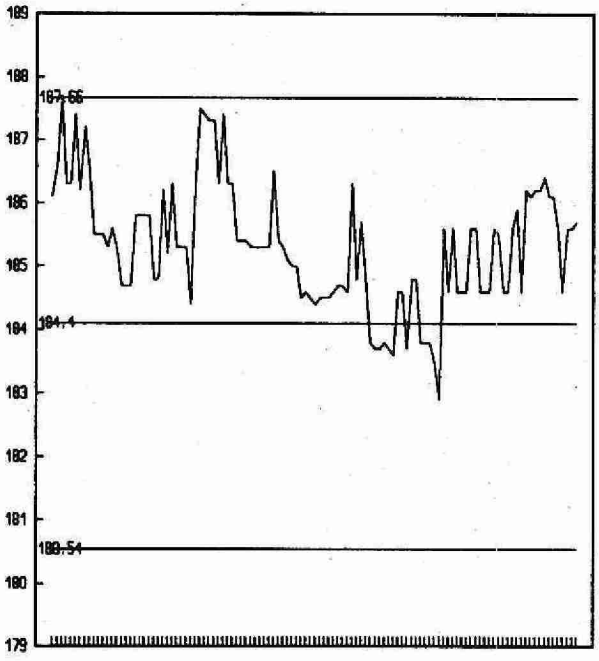
QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92



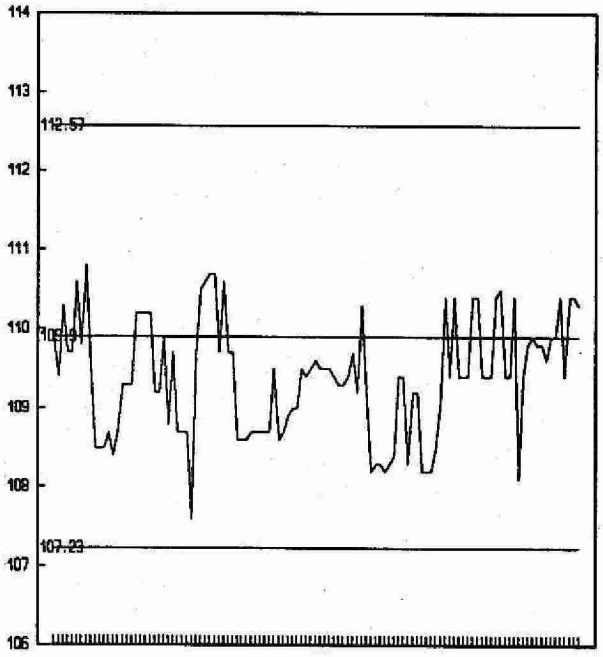
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/04/74
LIS Test Name Code	: COND25	Units	: µS/cm at 25°C
Work Station Code	: WATS	Unit Code	: 350351
Method Code	: 002BI2	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Industrial effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured.
pH and Total fixed endpoint alkalinity are determined simultaneously.

INSTRUMENTATION:

Automated modular continual flow conductivity system comprising of a sampler, water bath, pump, conductivity meter with cell plus microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)

CONDUCTIVITY

QUALITY CONTROL DATA FROM 03/01/92 TO 31/12/92

Lab: Titration Analytical Range: - to 2000 µS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	160	1413.0	1408.4	-4.6	7.142
B :	160	717.8	716.2	-1.6	3.222
A+B :	160	2130.8	2124.7	-6.1	9.460
A-B :	160	695.2	692.2	-3.0	5.769
C :	160	147.0	148.9	1.9	1.161
B+C :	160	864.8	865.1	0.3	3.926
B-C :	160	570.8	567.3	-3.5	2.838

s.d.(AB) S(between runs): 5.5 Sw(within run): 4.1 S/Sw: 1.4

s.d.(BC) S(between runs): 2.4 Sw(within run): 2.0 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

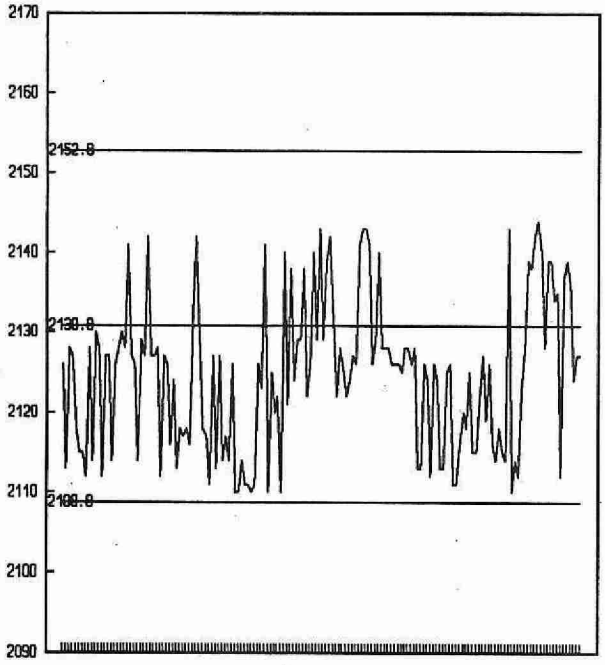
2108.8	- 2152.8	for	A+B
678.7	- 711.7	for	A-B
852.96	- 876.64	for	B+C
561.92	- 579.68	for	B-C

DUPLICATES:

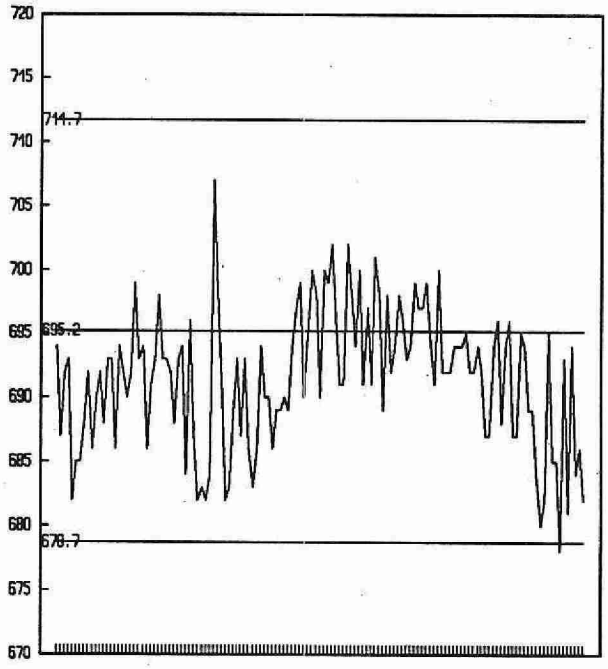
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
26	0	-	100	0.887	1.5
187	100	-	500	2.132	0.8
122	500	-	1000	3.968	0.7
56	1000	-	2000	12.852	0.9
23	2000	-	15000	25.074	3.5
414	Overall			3.830	

CONDUCTIVITY (µS/cm)

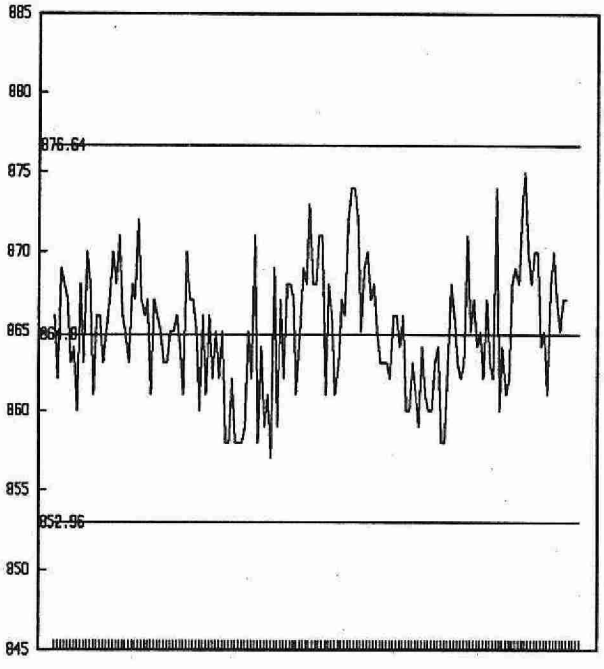
QUALITY CONTROL DATA FROM 03/01/92 TO 31/12/92



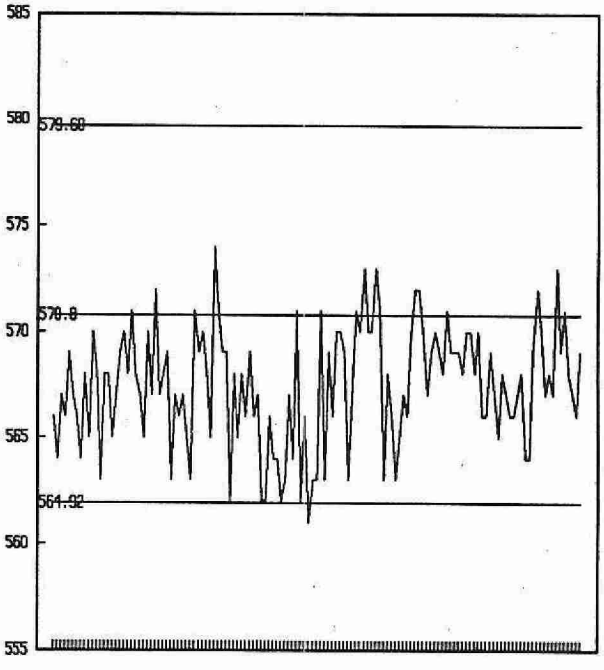
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** CONDUCTIVITY ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 20/05/87
LIS Test Name Code	: COND25	Units	: µS/cm at 25°C
Work Station Code	: WQSDIRT	Unit Code	: 350351
Method Code	: 004AB4	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 75 mL
Container	: Plastic or glass

ANALYTICAL PROCEDURE:

After equilibration at 25°C, the conductivity of the sample is measured; samples are filtered first if necessary. Analysis is performed on supernatant or filtrate.

INSTRUMENTATION:

Conductivity meter with cell enclosed in a water jacket; temperature controlled water circulator.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 5 T value: 25

CONTROLS:

Calibration : BL plus 4 standards, e.g. QCA

CONDUCTIVITY

QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92

Lab: Titration Analytical Range: - to 10000 µS/cm

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	25	6668	6648	-20.0	32.44
B :	25	2767	2756	-11.0	17.53
A+B :	25	9435	9404	-31.0	38.41
A-B :	25	3901	3891	-10.0	35.28
C :	25	1413	1406	-7.0	6.51
D :	25	717	716	-1.0	2.93
C+D :	25	2130	2122	-8.0	7.10
C-D :	25	696	689	-7.0	7.17

s.d.(AB) S(between runs): 26.1 Sw(within run): 24.9 S/Sw: 1.0

s.d.(CD) S(between runs): 5.05 Sw(within run): 5.07 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

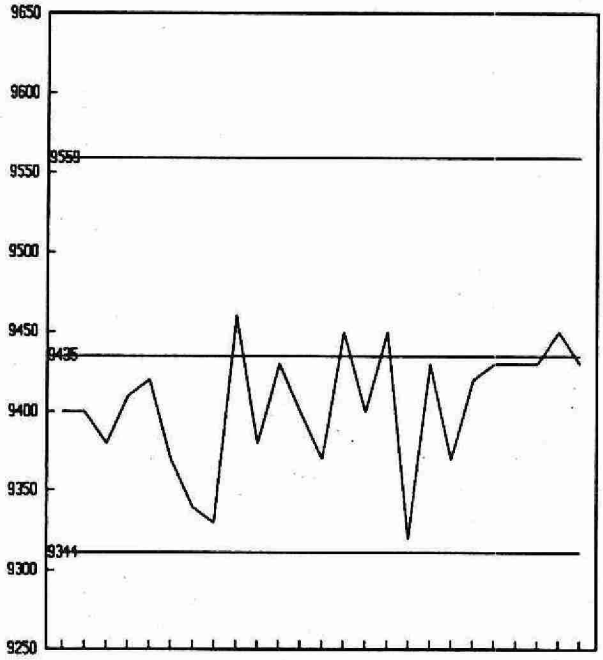
9311	- 9559	for	A+B
3808	- 3994	for	A-B
2094	- 2167	for	C+D
668	- 724	for	C-D

DUPLICATES:

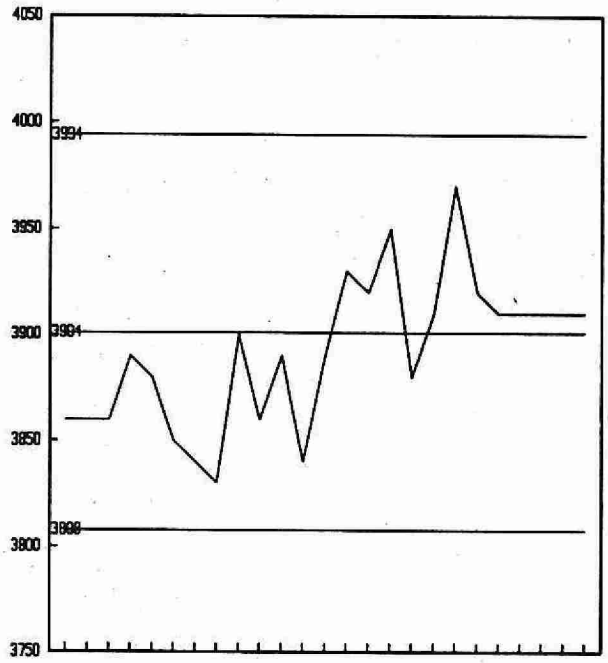
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
26	0 - 500	1.325	0.6
29	500 - 1000	3.154	0.5
11	1000 - 5000	7.992	0.6
0	5000 - 10000	N.A.	N.A.
66	Overall	2.703	

CONDUCTIVITY (µS/cm)

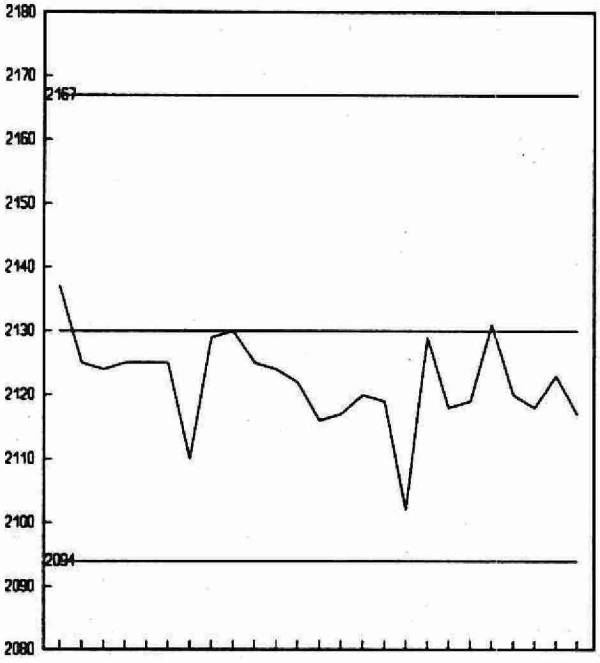
QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92



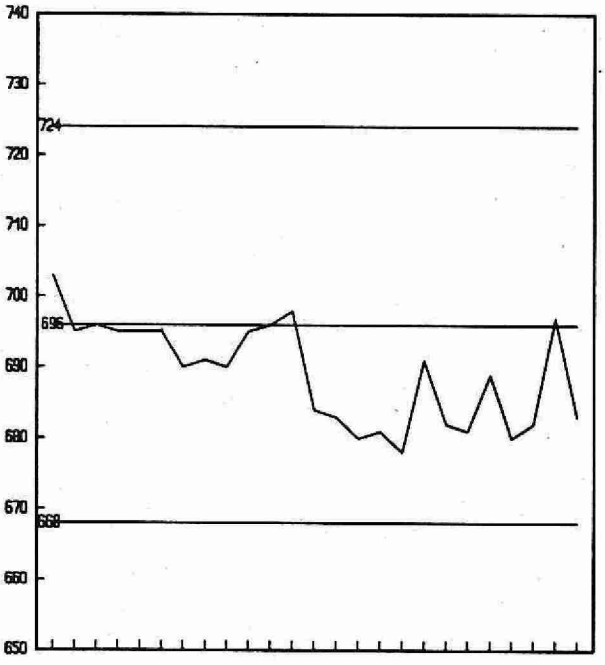
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** COPPER, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: CUUT	Units	: µg/L
Work Station Code	: DOTRACE	Unit Code	: 063829
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3306A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required : 5mL
Container : glass or plastic, capped, acidified to 0.25% with $HN0_3$

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 324.8nm.
Absorbance : 0.8 at full scale

INSTRUMENTATION:

A graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.003 T value: 0.015

CALIBRATION:

Blank plus 4 standards.

CONTROLS:

Calibration : Long Term Blank, 1 NRC solution, 3 duplicates
Drift : 1 blank plus 1 standard

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

COPPER, TOTAL

QUALITY CONTROL DATA FROM 23/01/92 TO 92/12/92

Lab: Dorset Soils

Analytical Range: - to 10 µg/L as Cu

QUALITY CONTROL:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
QCA :	20	0.5127	0.02921
NRC :	63	2.6870	0.05973

DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
28	0.00 - 0.10	0.007	21.6
65	0.10 - 0.50	0.037	16.3
14	0.50 - 1.00	0.101	12.3
7	1.0 - 10.00	0.310	11.6
114	Overall	0.038	

OTHER CHECKS:

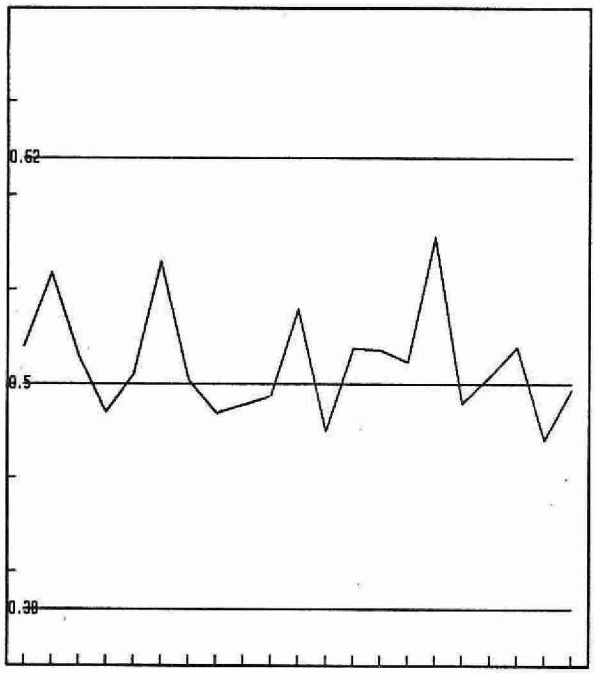
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	20	0.0184	0.0171

NOTES:

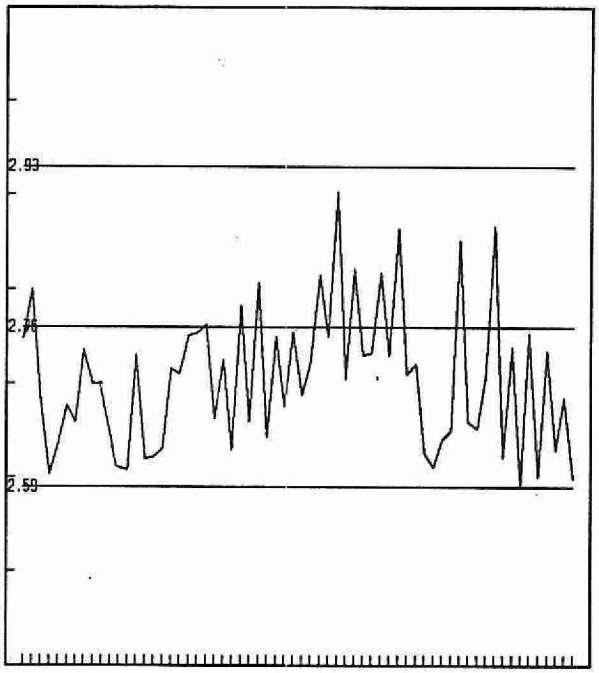
QCA is a low level calibration control standard prepared from an EPA ampoule.

COPPER, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 23/01/92 TO 21/12/92



QUALITY CONTROL STANDARD A



NRC REFERENCE SAMPLE

_____CONTROL LIMIT

*** FLUORIDE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/80
LIS Test Name Code	: FFIDUR	Units	: µg/L as F
Work Station Code	: DOSPF	Unit Code	: 063809
Method Code	: 001AIE	Supervisor	: J. McBride
Method Reference No.	: E3041A		
Sample Type/Matrix	: Precipitation, Lakes, and Streams		

SAMPLING:

Quantity Required	: 50 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Fluoride is determined by specific ion electrode using an automated flow system. Prior to measurement the sample is mixed with a high ionic strength buffer containing; sodium citrate, disodium ethylenediaminetetraacetate (EDTA), phosphoric acid, and sufficient sodium hydroxide to obtain pH 6.7.

INSTRUMENTATION:

Automated modular continuous flow ion specific electrode system.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL plus 1 standard in duplicate
Interference	: Combined fluoride and aluminum standard confirms that aluminum is not an interference.

NOTES:

Values for recoveries are based upon the average recovery value obtained.

FLUORIDE

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Dorset Analytical Range: - to 70.0 µg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	57	48	47.93	-0.07	0.795
B :	57	24	23.88	-0.12	0.568
A+B :	57	72	71.82	-0.18	1.119
A-B :	57	24	24.05	0.05	0.811

s.d.(AB) S(between runs): 0.69 Sw(within run): 0.57 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

67.5	-	76.5	for	A+B
21.0	-	27.0	for	A-B

DUPLICATES:

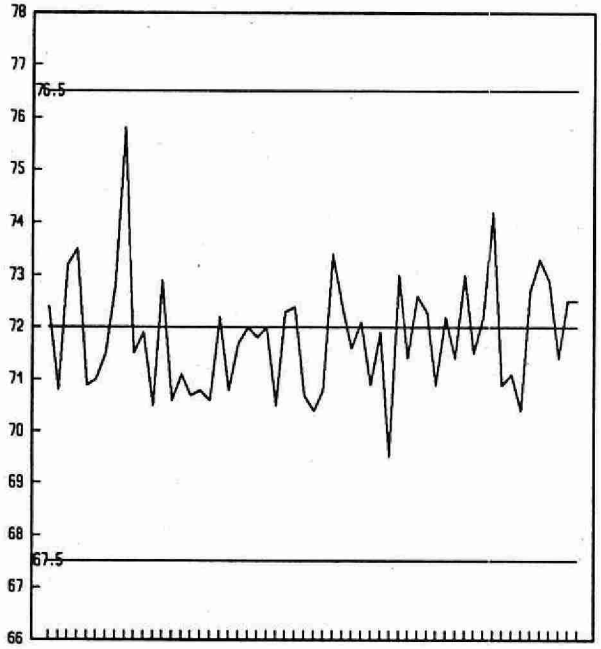
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
38	0.0	-	10.0	0.337	8.2
88	10.0	-	40.0	0.673	5.3
84	40.0	-	70.0	0.902	0.7
210	Overall			0.689	

OTHER CHECKS:

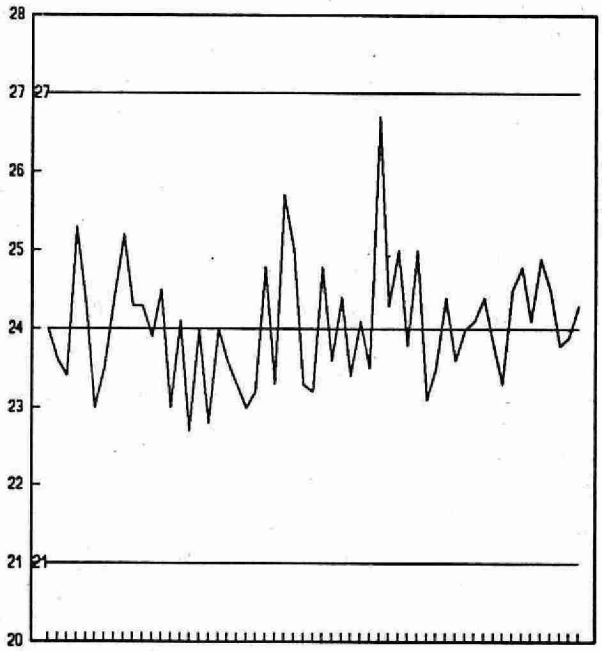
	Number of Data	Data Mean	Standard(1) Deviation
Al Interference	57	59.5	1.048

FLUORIDE (µg/L as F)

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92



QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A−B

———— CONTROL LIMIT

*** FLUORIDE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: Before '74
LIS Test Name Code	: FFIDUR	Units	: mg/L as F
Work Station Code	: WFNO3	Unit Code	: 064809
Method Code	: 003AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3221A		
Sample Type/Matrix	: Domestic Waters, Surface Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Using an automated flow system the sample is distilled in the presence of sulphuric acid at 160^{0}C; the distillate is then reacted (in an acetic acid-acetate buffer media) with Alizarin Fluorine Blue and lanthanum nitrate to form a ternary Alizarin Blue-lanthanide-fluoride complex.
Approximate absorbance: 0.8 at the full scale level.

INSTRUMENTATION:

Modular continuous flow colourimetric system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Data capture, reduction, and processing via a muli-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

FLUORIDE

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92

Lab: Colourimetry Analytical Range: - to 2.0 mg/L as F

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	87	1.6	1.608	0.008	0.0170
B :	87	0.8	0.800	0.000	0.0136
A+B :	87	2.4	2.408	0.008	0.0235
A-B :	87	0.8	0.808	0.008	0.0200
C :	87	0.16	0.162	0.002	0.0063
B+C :	87	0.96	0.962	0.002	0.0150
B-C :	87	0.64	0.638	-0.002	0.0150

s.d.(AB) S(between runs): 0.015 Sw(within run): 0.014 S/Sw: 1.1

s.d.(BC) S(between runs): 0.011 Sw(within run): 0.011 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.3	-	2.5	for	A+B
0.73	-	0.87	for	A-B
0.92	-	1.0	for	B+C
0.60	-	0.68	for	B-C

DUPLICATES:

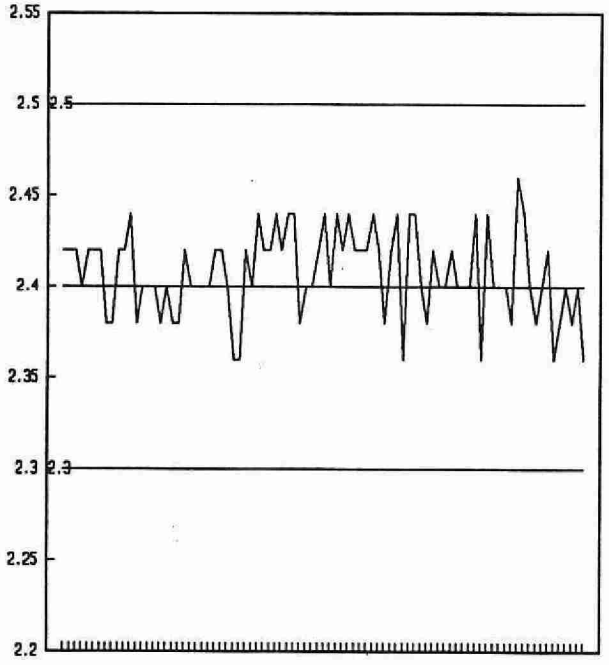
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
203	0.00	-	0.40	0.0116	12.1
21	0.40	-	1.00	0.0204	2.5
29	1.00	-	2.00	0.0221	1.8
253	Overall			0.0139	

OTHER CHECKS:

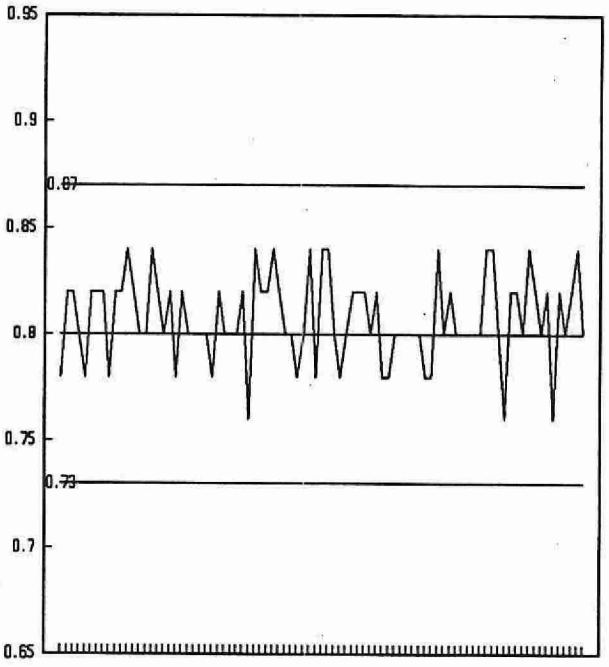
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	87	0.000	0.011

FLUORIDE (mg/L as F)

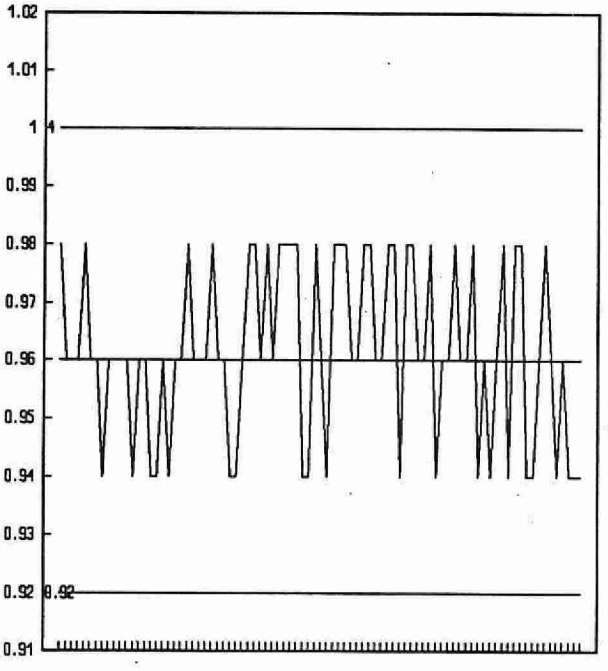
QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92



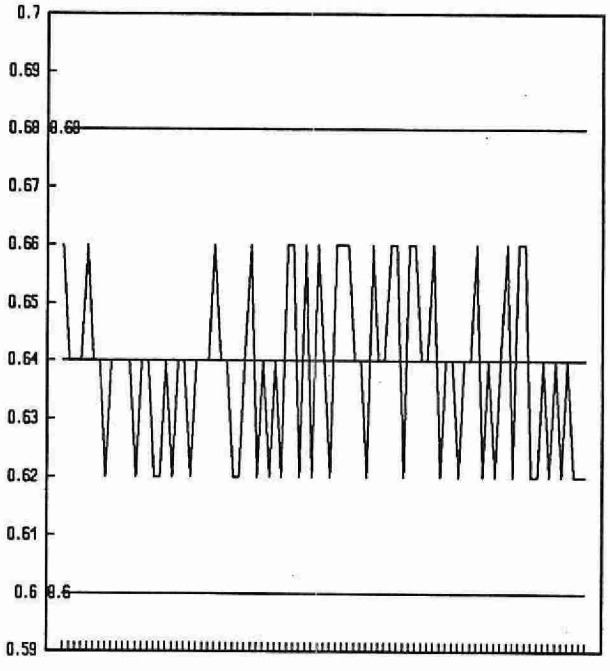
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as $CaCO_3$
Work Station Code	: PRAAS	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation PRAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spetrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

Refer to Calcium and Magnesium tests at PRAAS

CONTROLS:

Refer to Calcium and Magnesium tests at PRAAS

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
LIS Test Name Code	: HARDT	Units	: mg/L as $CaCO_3$
Work Station Code	: RMAAS	Unit Code	: 064915
Method Code	: CALC10	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation RMAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spetrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION:

Refer to Calcium and Magnesium tests at RMAAS

CONTROLS:

Refer to Calcium and Magnesium tests at RMAAS

*** HARDNESS ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
LIS Test Name Code	: HARDT	Units	: mg/L as $CaCO_3$
Work Station Code	: WAAS	Unit Code	: 064915
Method Code	: CALC01	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents, Sewage,Industrial Wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analysed for calcium and magnesium by AAS at workstation WAAS. Hardness is calculated using the formula:

$$HARDT = (CAUR \times 2.497) + (MGUR \times 4.118)$$

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

Refer to Calcium and Magnesium tests at WAAS

CONTROLS:

Refer to Calcium and Magnesium tests at WAAS

*** IRON, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: FEUT	Units	: µg/L
Work Station Code	: DOFEMN	Unit Code	: 063826
Method Code	: 504BC2	Supervisor	: J. McBride
Method Reference No.	: E3303A		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required	: 25mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO_3

ANALYTICAL PROCEDURE:

A sample, autoclaved in acidic reducing medium is introduced into the chemistry stream. A reducing agent and a buffer are added to the sample. TPTZ is added to develop a blue colour, the intensity of which is proportional to the concentration of Fe in the sample. The colour is measured at 600nm.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2 T value: 10

CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration	: Long Term blank, 2 digested blanks, 2 QC's, 4 duplicates and 2 recoveries
Drift	: blank plus 1 standard every 20 samples.

NOTES:

The method was updated in April 1992 and thus, two summaries are given (Jan 7 - Apr 23) and (Apr 29 - Dec 23).

IRON, TOTAL

QUALITY CONTROL DATA FROM 07/01/92 TO 23/04/92

Lab: Dorset Analytical Range: - to 1000 µg/L as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	27	800.0	797.26	-2.74	7.171
B :	27	200.0	197.89	-2.11	4.767
A+B :	27	1000.0	999.59	-0.41	5.957
A-B :	27	600.0	599.37	-0.63	5.492

s.d.(AB) S(between runs): 6.09 Sw(within run): 3.88 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

979	-	1021	for	A+B
584	-	616	for	A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	20	800.0	803.9	8.16
R2 :	20	200.0	200.92	4.99

DUPLICATES:

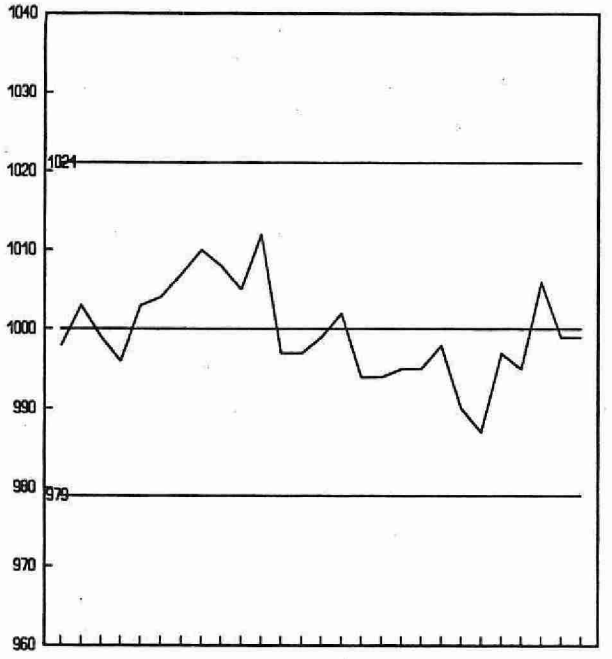
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
29	0.0	-	200.0	11.86	17.8
21	200.0	-	500.0	18.10	8.1
5	500.0	-	1000.0	18.65	2.6
55	Overall			14.59	

OTHER CHECKS:

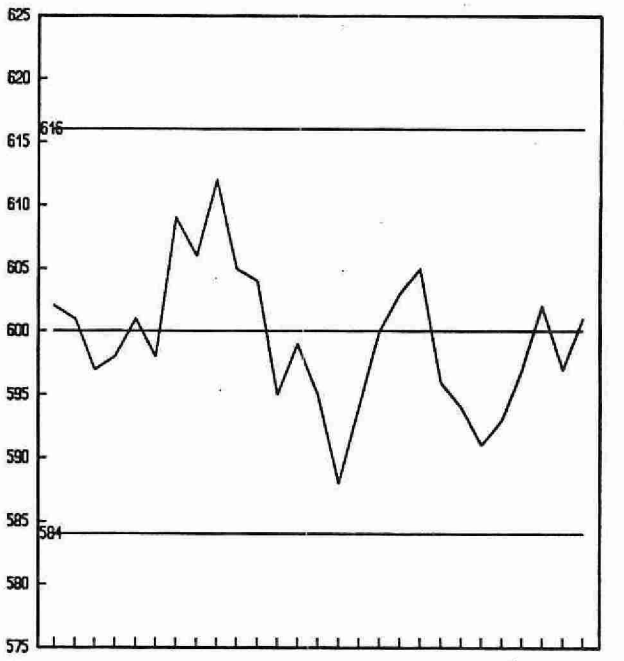
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	27	-2.22	3.974
Digested Blank	27	3.37	4.634

IRON, TOTAL (µg/L as Fe)

QUALITY CONTROL DATA FROM 07/01/92 TO 23/04/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** IRON, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: FEUT	Units	: µg/L
Work Station Code	: DOFEMN	Unit Code	: 063826
Method Code	: 504BC2	Supervisor	: J. McBride
Method Reference No.	: E3303A		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required	: 25mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO_3

ANALYTICAL PROCEDURE:

An undigested sample is introduced to an in-line UV digestor. A reducing agent and a buffer are added to the sample. TPTZ is added to develop a blue colour, the intensity of which is proportional to the concentration of Fe in the sample. The colour is measured at 600nm.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 2 T value: 10

CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration	: Long Term blank, 3 QC's, 4 duplicates
Drift	: blank plus 1 standard every 10 samples.

IRON, TOTAL

QUALITY CONTROL DATA FROM 29/04/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 1000 µg/L as Fe

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	750.0	749.24	-1.76	4.662
B :	45	250.0	247.56	-2.44	2.989
A+B :	45	1000.0	996.52	-3.48	5.475
A-B :	45	500.0	501.69	1.69	5.636
C :	45	50.0	48.38	-1.62	2.188
B+C :	45	300.0	295.64	-4.36	3.784
B-C :	45	200.0	199.18	-0.82	3.353

s.d.(AB) S(between runs): 3.91 Sw(within run): 3.98 S/Sw: 0.98

s.d.(BC) S(between runs): 2.62 Sw(within run): 2.37 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

975	-	1025	for	A+B
520	-	480	for	A-B
285	-	315	for	B+C
190	-	210	for	B-C

DUPLICATES:

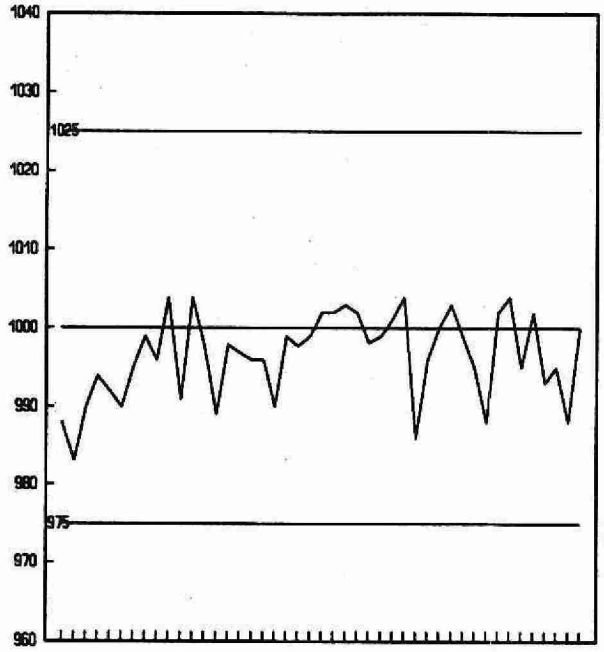
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
83	0.0	-	200.0	2.57	5.4
21	200.0	-	500.0	6.04	2.0
8	500.0	-	1000.0	7.41	1.5
111	Overall			3.10	

OTHER CHECKS:

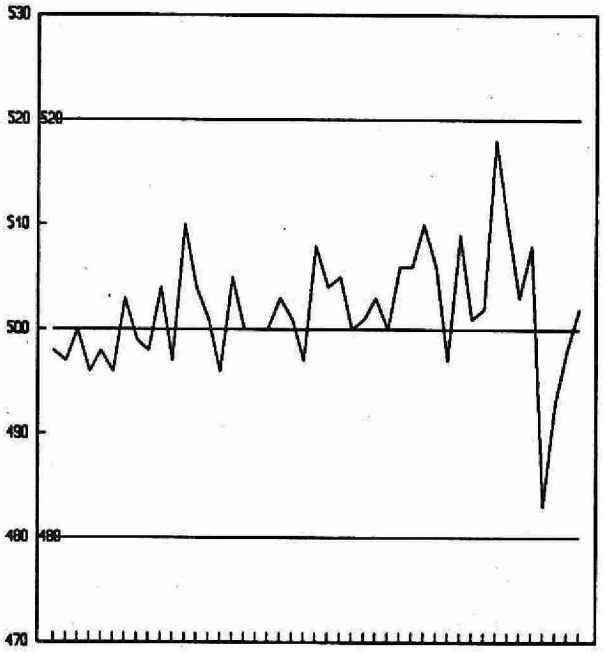
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.142	0.719

IRON, TOTAL (µg/L as Fe)

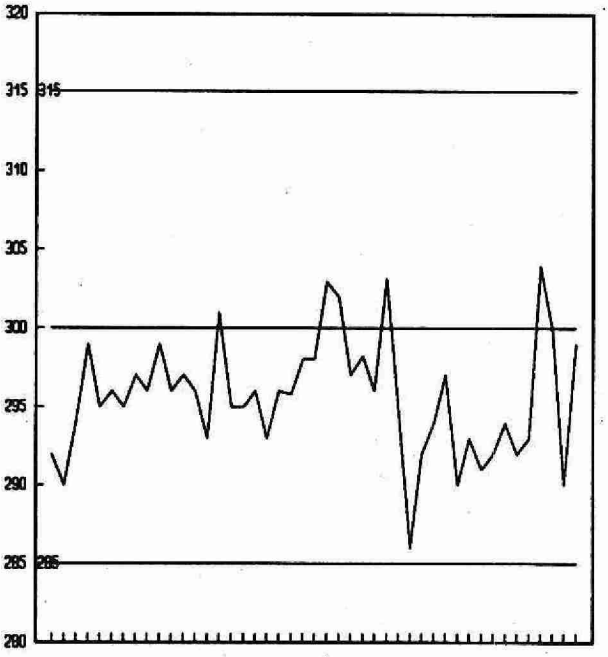
QUALITY CONTROL DATA FROM 29/04/92 TO 23/12/92



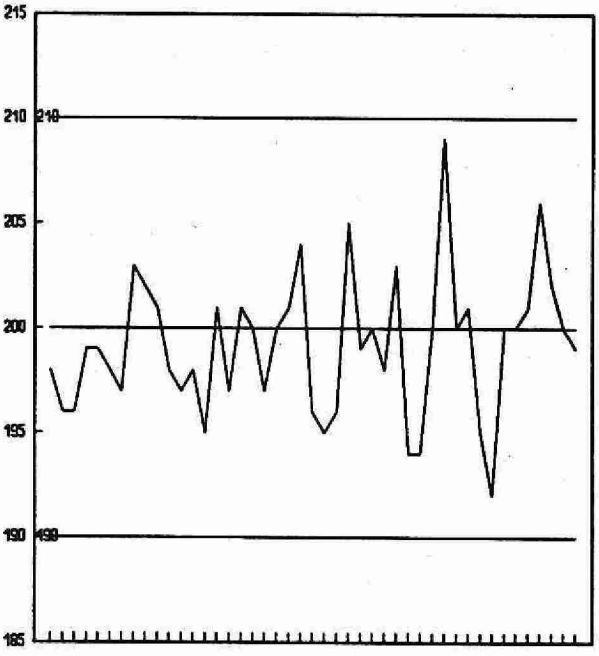
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** LEAD, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: PBUT	Units	: µg/L
Work Station Code	: DOTRACE	Unit Code	: 063882
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3307A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required : 5mL
Container : glass or plastic, capped, acidified to 0.25% with $HN0_3$

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 217nm.
Absorbance : 0.35 at full scale

INSTRUMENTATION:

A graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.003 T value: 0.015

CALIBRATION:

Blank plus 5 standards.

CONTROLS:

Calibration : Long Term Blank, 1 NRC solution, 3 duplicates
Drift : 1 blank plus 1 standard

NOTES:

Work station was formerly DOASV and changed in August 1991 to DOTRACE.

LEAD, TOTAL

QUALITY CONTROL DATA FROM 17/01/92 TO 29/12/92

Lab: Dorset Soils Analytical Range:- to 10 µg/L as Pb

QUALITY CONTROL:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
QCA :	19	0.5705	0.0494
NRC :	57	0.1267	0.0057

DUPLICATES:

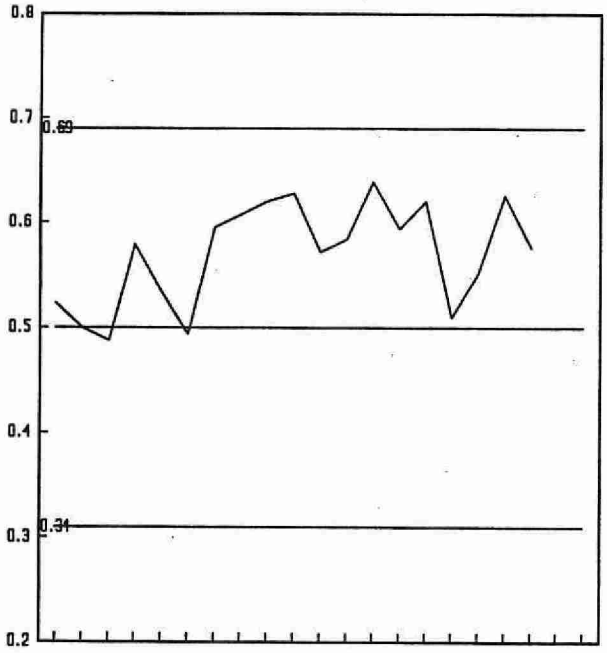
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
72	0.00 - 0.10	0.0123	60.9
17	0.10 - 0.20	0.0321	63.6
0	0.20 - 10.00	N.A.	N.A
89	Overall	0.0164	

NOTES:

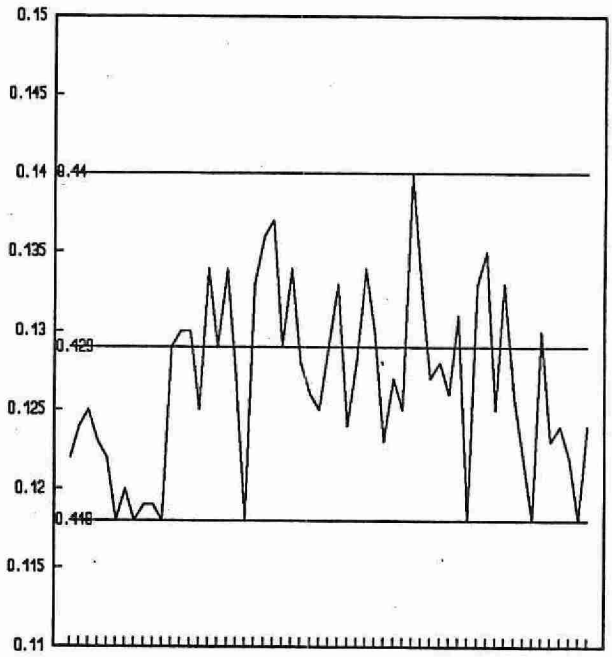
QCA is a low level calibration control standard prepared from an EPA ampoule.

LEAD, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 17/01/92 TO 29/12/92



QUALITY CONTROL STANDARD A



NRC REFERENCE SAMPLE

_____CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAA400	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J.McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.005 to 0.001 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.001 or less on the Varian AA 400 instrument.

MAGNESIUM

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92

Lab: Atomic Absorption Analytical Range: - to 0.500 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	42	0.30	0.3014	0.0014	0.0025
B :	42	0.05	0.0505	0.0005	0.0009
A+B :	42	0.35	0.3519	0.0019	0.0028
A-B :	42	0.25	0.2509	0.0009	0.0025

s.d.(AB) S(between runs): 0.0019 Sw(within run): 0.0017 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.338 - 0.362 for A+B
0.241 - 0.259 for A-B

DUPLICATES:

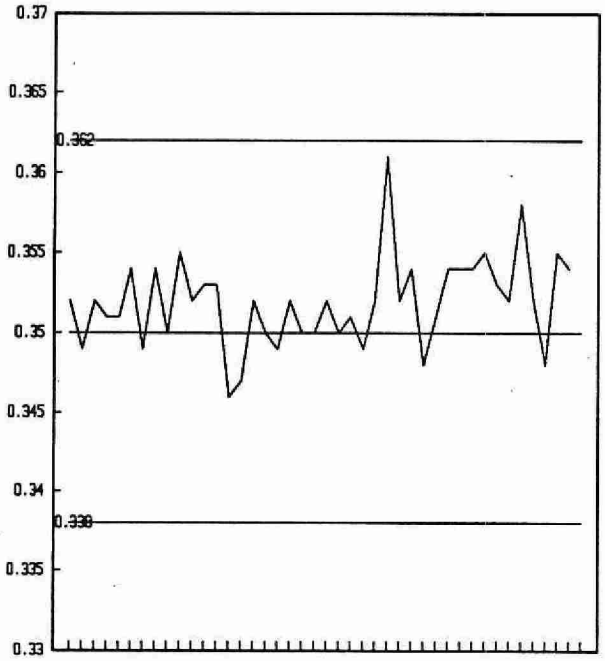
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
85	0.00 - 0.05	0.0006	3.6
23	0.05 - 0.25	0.0015	2.0
7	0.25 - 0.50	0.0025	0.7
115	Overall	0.0007	

OTHER CHECKS:

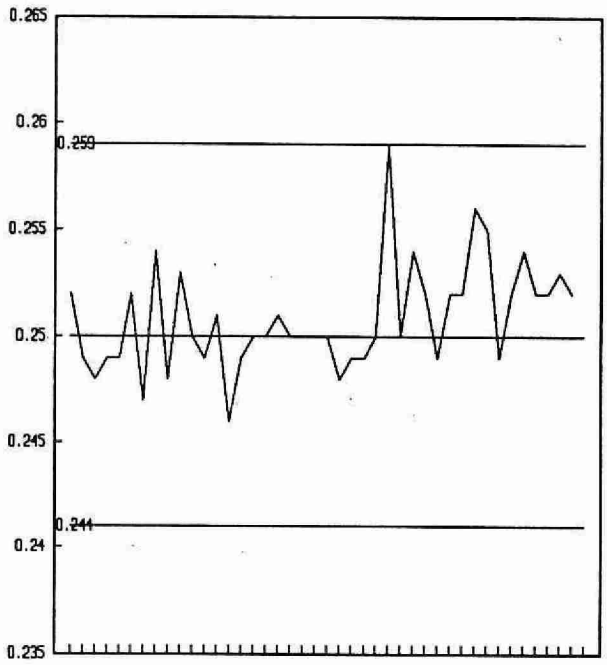
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	42	0.0003	0.0019

MAGNESIUM (mg/L as Mg)

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: PRAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm with an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

Qualtiy Control limits were changed on June 17, 1992. Qc data prior to this date were under the control of former limits.

MAGNESIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92

Lab: Atomic Absorption Analytical Range: - to 2.0 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	91	1.6	1.601	0.001	0.0134
B :	91	0.4	0.402	0.002	0.0046
A+B :	91	2.0	2.004	0.004	0.0147
A-B :	91	1.2	1.199	-0.001	0.0136
C :	91	0.1	0.102	0.002	0.0015
B+C :	91	0.5	0.504	0.004	0.0054
B-C :	91	0.3	0.301	0.001	0.0041

s.d.(AB) S(between runs): 0.01 Sw(within run): 0.01 S/Sw: 1.0

s.d.(BC) S(between runs): 0.0033 Sw(within run): 0.0029 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.96	-	2.04	for A+B
1.17	-	1.23	for A-B
0.483	-	0.517	for B+C
0.313	-	0.287	for B-C

DUPLICATES:

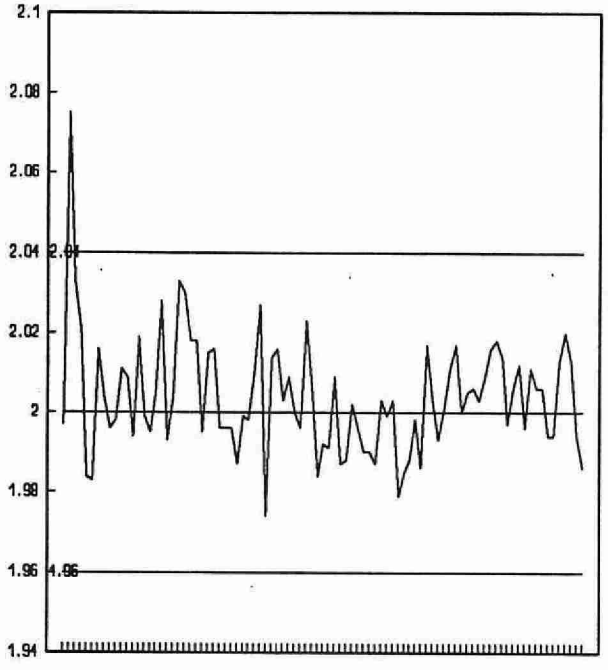
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
38	0.00	-	0.40	0.0027	1.1
123	0.40	-	1.00	0.0076	1.2
97	1.00	-	2.00	0.0177	1.3
258	Overall			0.0104	

OTHER CHECKS:

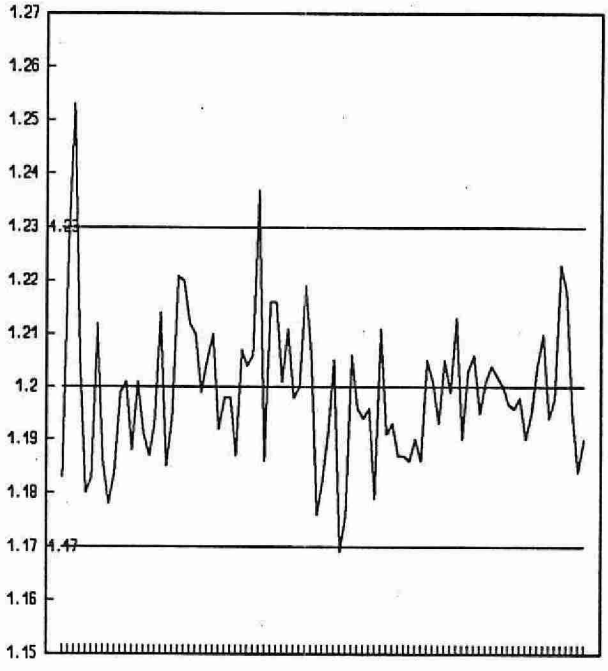
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	91	-0.0001	0.0009

MAGNESIUM (mg/L as Mg)

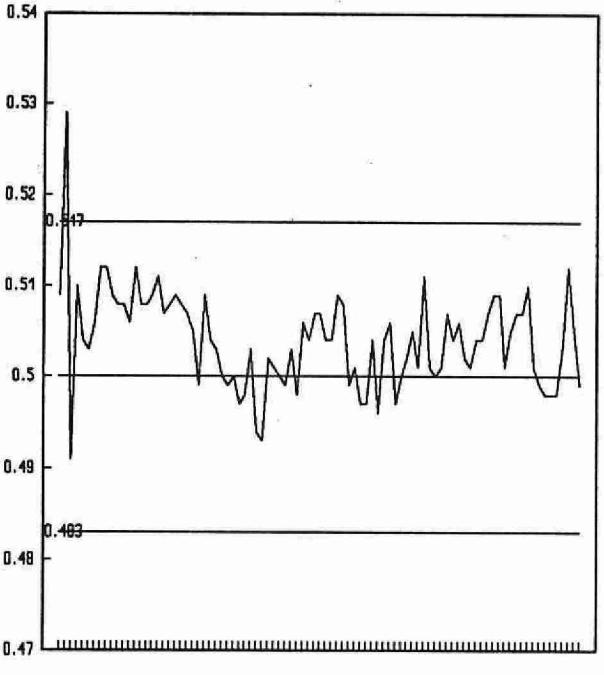
QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92



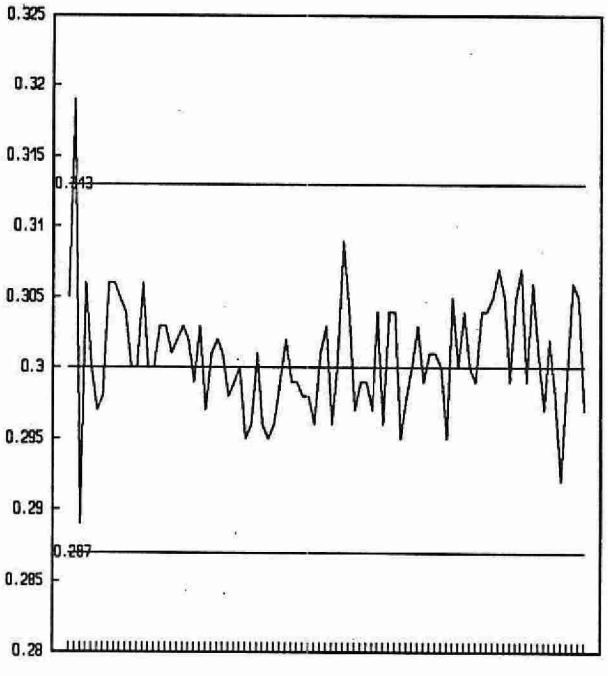
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: RMAAS	Unit Code	: 064812
Method Code	: 0901A1	Supervisor	: J.McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.19 at the full scale level

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples.

MAGNESIUM

QUALITY CONTROL DATA FROM 09/01/92 TO 30/12/92

Lab: Atomic Absorption Analytical Range: - to 10.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	155	8.00	7.994	-0.006	0.0688
B :	155	2.00	2.013	0.013	0.0224
A+B :	155	10.00	10.008	0.008	0.0735
A-B :	155	6.00	5.982	-0.018	0.0712
C :	155	0.50	0.513	0.013	0.0078
B+C :	155	2.50	2.527	0.027	0.0266
B-C :	155	1.50	1.499	-0.001	0.0205

s.d.(AB) S(between runs): 0.051 Sw(within run): 0.050 S/Sw: 1.01

s.d.(BC) S(between runs): 0.017 Sw(within run): 0.014 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.66	-	10.34	for	A+B
5.75	-	6.25	for	A-B
2.38	-	2.62	for	B+C
1.41	-	1.59	for	B-C

DUPLICATES:

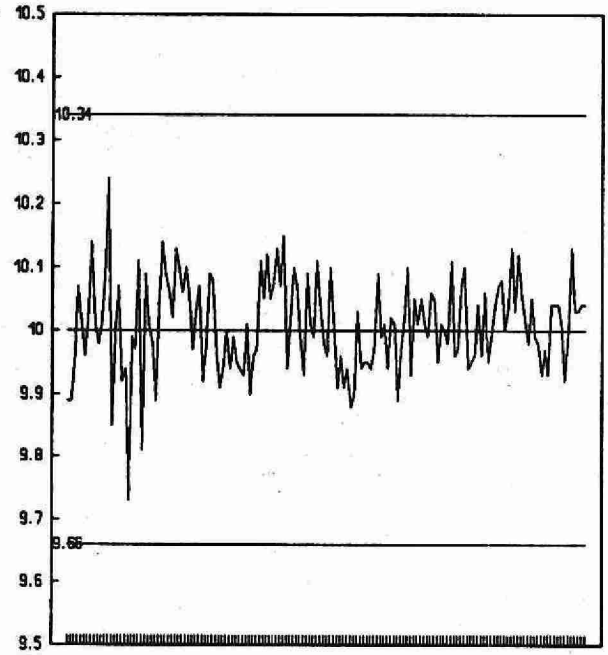
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
101	0.00	-	1.00	0.0098	2.1
160	1.00	-	4.00	0.0460	2.5
68	4.00	-	7.00	0.0978	2.5
106	7.00	-	10.00	0.1285	1.6
435	Overall			0.0645	

OTHER CHECKS:

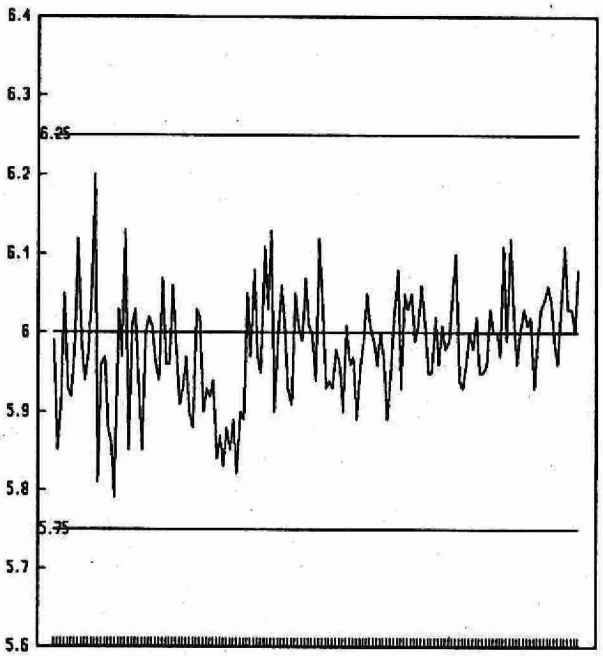
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	155	0.0001	0.0011

MAGNESIUM (mg/L as Mg)

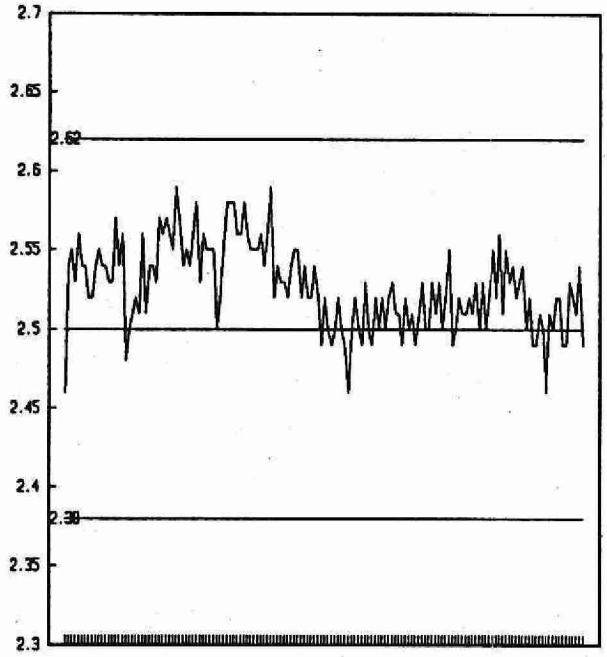
QUALITY CONTROL DATA FROM 09/01/92 TO 30/12/92



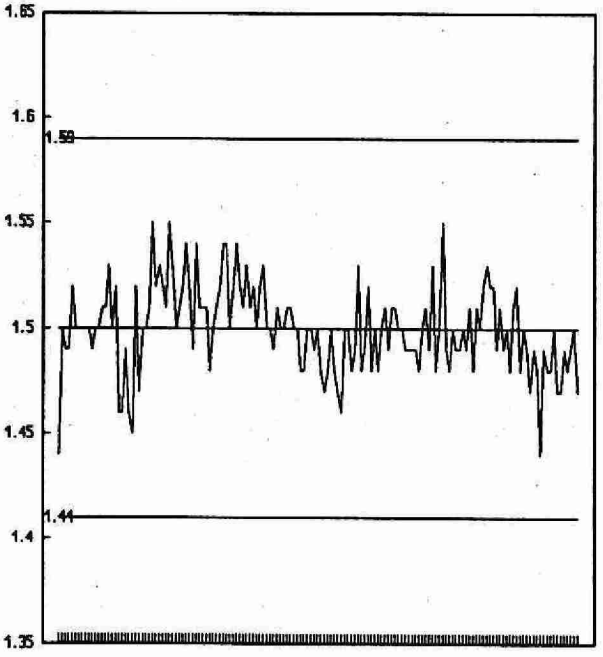
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** MAGNESIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: MGUR	Units	: mg/L as Mg
Work Station Code	: WAAS	Unit Code	: 064812
Method Code	: 001CA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents,Sewage,Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 285.2 nm using an air-acetylene flame. Lanthanum chloride is added as a releasing agent via an automated sampling train.
Approximate absorbance: 1.187 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

MAGNESIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92

Lab: Atomic Absorption Analytical Range: - to 50.00 mg/L as Mg

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	127	40.0	39.89	-0.11	0.4781
B :	127	10.0	10.03	0.03	0.1584
A+B :	127	50.0	49.92	-0.08	0.5165
A-B :	127	30.0	29.86	-0.14	0.4906
C :	127	2.5	2.51	0.01	0.0897
B+C :	127	12.5	12.54	0.04	0.2136
B-C :	127	7.5	7.52	0.02	0.1437

s.d.(AB) S(between runs): 0.36 Sw(within run): 0.35 S/Sw:1.03

s.d.(BC) S(between runs): 0.13 Sw(within run): 0.10 S/Sw:1.27

On any given day the calibration is accepted if the values obtained lie within the ranges:

47.8	- 52.2	for	A+B
28.5	- 31.5	for	A-B
11.4	- 13.6	for	B+C
6.8	- 8.2	for	B-C

DUPLICATES:

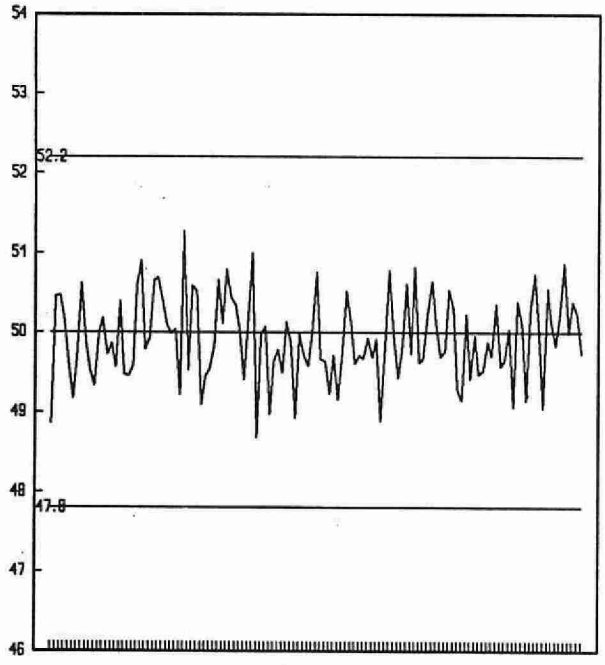
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
74	0.00 - 5.00	0.0754	7.0
64	5.00 - 10.00	0.1487	1.8
140	10.00 - 25.00	0.2349	1.6
61	25.00 - 50.00	0.4848	1.5
339	Overall	0.2250	

OTHER CHECKS:

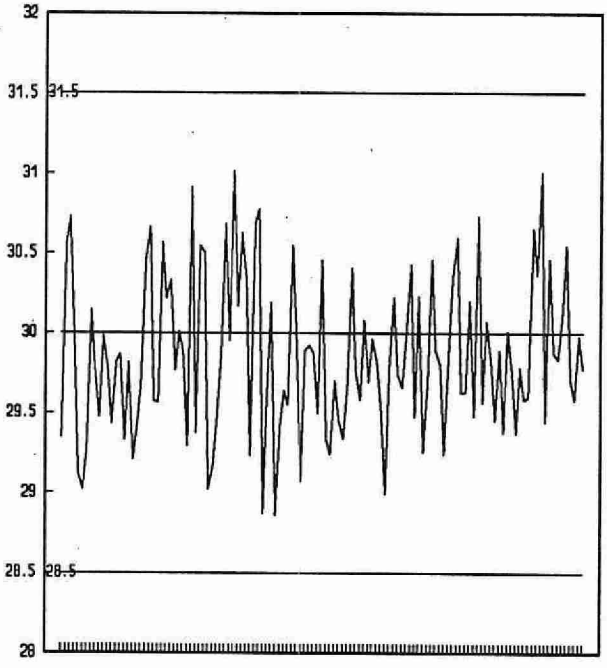
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	127	-0.0811	0.1031

MAGNESIUM (mg/L as Mg)

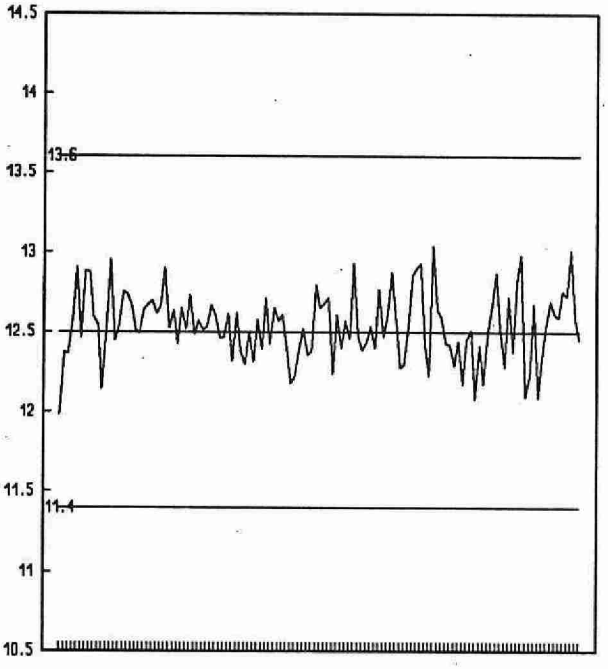
QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92



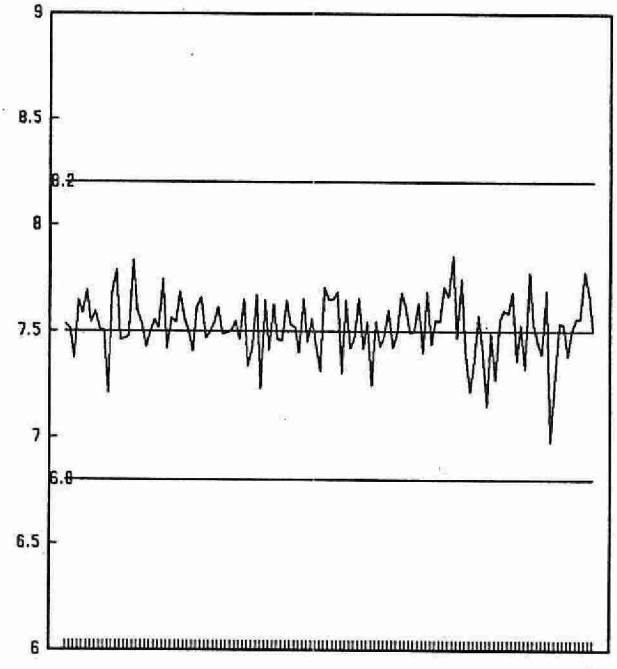
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** MANGANESE, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: MNUT	Units	: ug/L
Work Station Code	: DOFEMN	Unit Code	: 063826
Method Code	: 504BC2	Supervisor	: J. McBride
Method Reference No.	: E3303A		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required	: 25mL
Container	: glass or plastic, capped, acidified to 0.25% with HNO_3

ANALYTICAL PROCEDURE:

A sample, autoclaved in acidic reducing medium is introduced into the chemistry stream. A reducing agent and an ammonium buffer are added to the sample. Formaldoxime complexes with Mn to develop a colour the intensity of which is proportional to the concentration of Mn in the sample. EDTA is then added to complex interferences. The color is read at 480nm. A reference channel is used to counter the effects of residual natural colour in the sample. In the reference channel the EDTA is added prior to the addition of colour reagent.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 1 T value: 5

CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration	: Long Term blank, 2 digested blanks, 2 QC's, 4 duplicates and 2 recoveries
Drift	: blank plus 1 standard every 20 samples.

NOTES:

The method was updated in April 1992 and thus, two summaries are given (Jan 7 - Apr 23) and (Apr 29 - Dec 23).

MANGANESE, TOTAL

QUALITY CONTROL DATA FROM 07/01/92 TO 23/04/92

Lab: Dorset Analytical Range: - to 200.0 µg/L as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	27	160.0	159.70	-0.30	1.203
B :	27	40.0	39.89	-0.11	0.892
A+B :	27	200.0	199.59	-0.41	1.760
A-B :	27	120.0	119.81	-0.19	1.039

s.d.(AB) S(between runs): 1.06 Sw(within run): 0.73 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

196	-	204	for	A+B
117	-	123	for	A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	20	160.0	159.75	1.372
R2 :	20	40.0	40.25	0.8507

DUPLICATES:

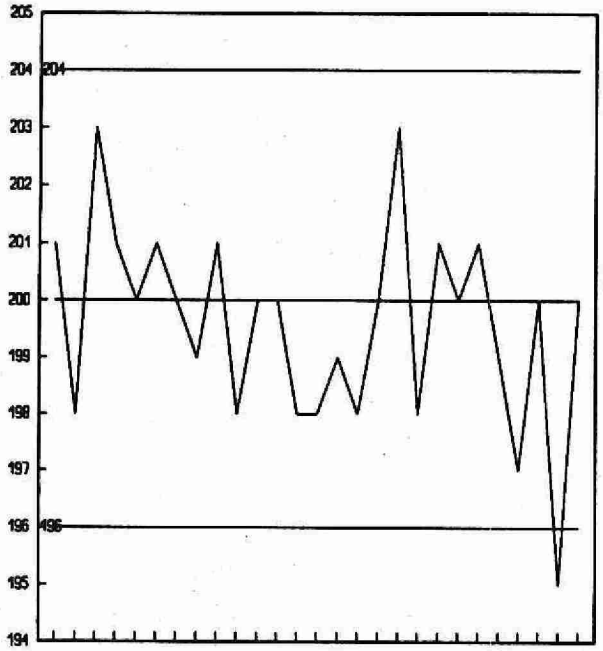
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
42	0.0	-	40.0	1.065	5.8
12	40.0	-	100.0	1.762	3.0
0	100.0	-	200.0	N.A.	N.A.
54	Overall			1.243	

OTHER CHECKS:

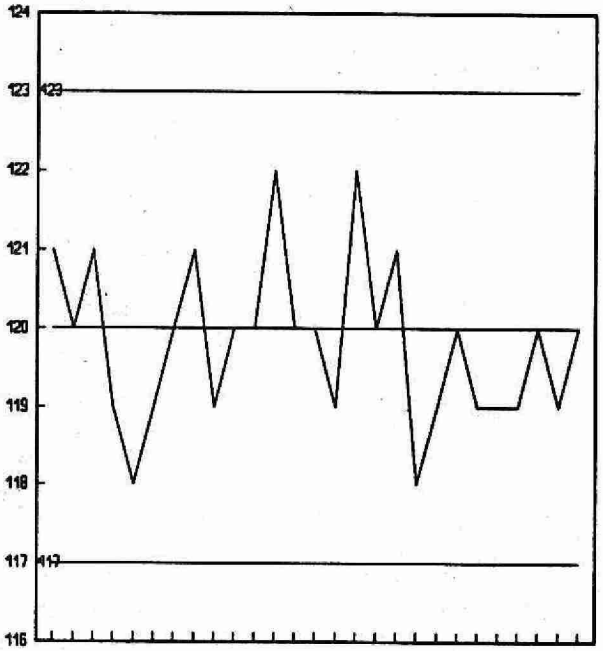
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	27	0.000	0.555
Digested Blank	27	0.185	0.396

MANGANESE TOTAL (µg/L as Mn)

QUALITY CONTROL DATA FROM 07/01/92 TO 23/04/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** MANGANESE, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: MNUT	Units	: µg/L
Work Station Code	: DOFEMN	Unit Code	: 063825
Method Code	: 504BC2	Supervisor	: J. McBride
Method Reference No.	: E3303A		
Sample Type/Matrix	: Surface water, precipitation, soil leachates		

SAMPLING:

Quantity Required	: 25mL
Container	: glass or plastic, capped, acidified to 0.25% with $HN0_3$

ANALYTICAL PROCEDURE:

An undigested sample is introduced to an in-line UV digestor. A reducing agent and an ammonium buffer are added to the sample. Formaldoxime complexes with Mn to develop a colour the intensity of which is proportional to the concentration of Mn in the sample. EDTA is then added to complex interferences. The color is read at 480nm. A reference channel is used to counter the effects of residual natural colour in the sample. In the reference channel the EDTA is added prior to the addition of colour reagent.

INSTRUMENTATION:

- An AAII autoanalyzer with colorimeter and automated sampler.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

Blank, plus 4 standards.

CONTROLS:

Calibration	: long term blank, 3 QC's, 4 duplicates.
Drift	: blank, plus 1 standard every 10 samples.

MANGANESE, TOTAL

QUALITY CONTROL DATA FROM 29/04/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 200.0 µg/L as Mn

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	45	150.0	149.93	-0.07	1.167
B :	45	50.0	49.25	-0.75	0.896
A+B :	45	200.0	199.12	-0.88	1.866
A-B :	45	100.0	100.68	0.68	1.062
C :	45	10.0	10.02	0.02	0.896
B+C :	45	60.0	59.21	-0.79	1.277
B-C :	45	40.0	39.22	-0.78	0.859

s.d.(AB) S(between runs): 1.04 Sw(within run): 0.75 S/Sw: 1.4

s.d.(BC) S(between runs): 0.75 Sw(within run): 0.61 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

196	- 204	for	A+B
97	- 103	for	A-B
56.6	- 63.4	for	B+C
37.4	- 42.6	for	B-C

DUPLICATES:

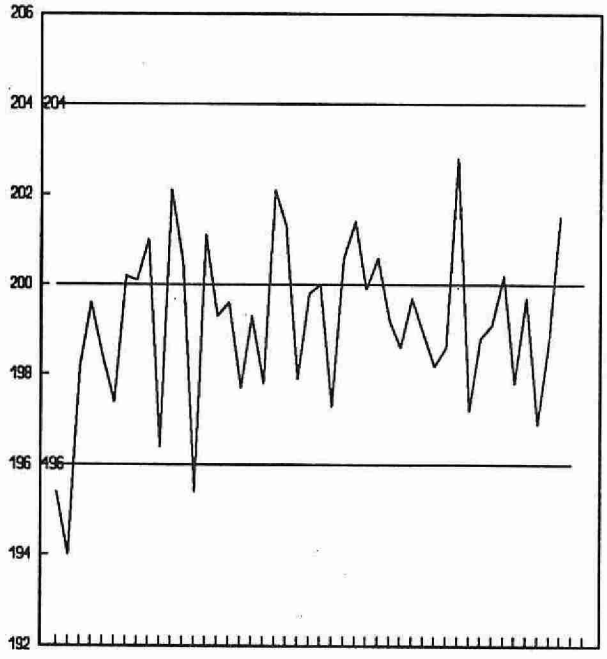
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
109	0.0	-	40.0	0.820	5.2
39	40.0	-	100.0	0.827	1.5
11	100.0	-	200.0	1.027	0.6
159	Overall			0.841	

OTHER CHECKS:

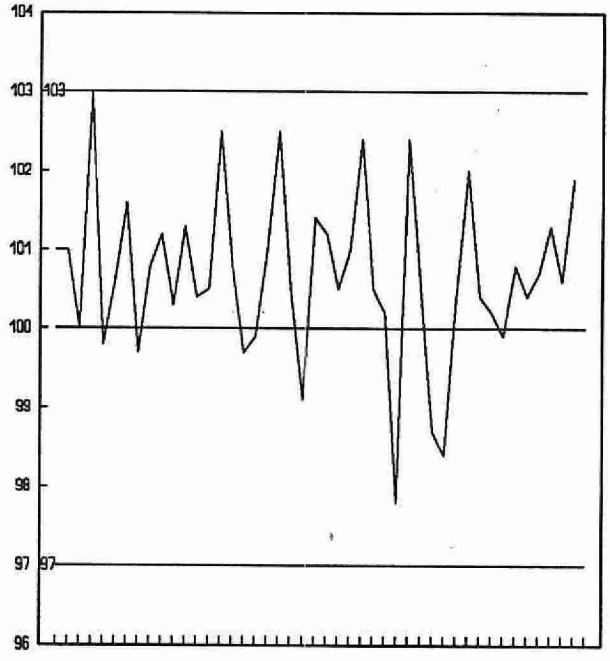
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	45	0.027	0.229

MANGANESE, TOTAL (ug/L as Mn)

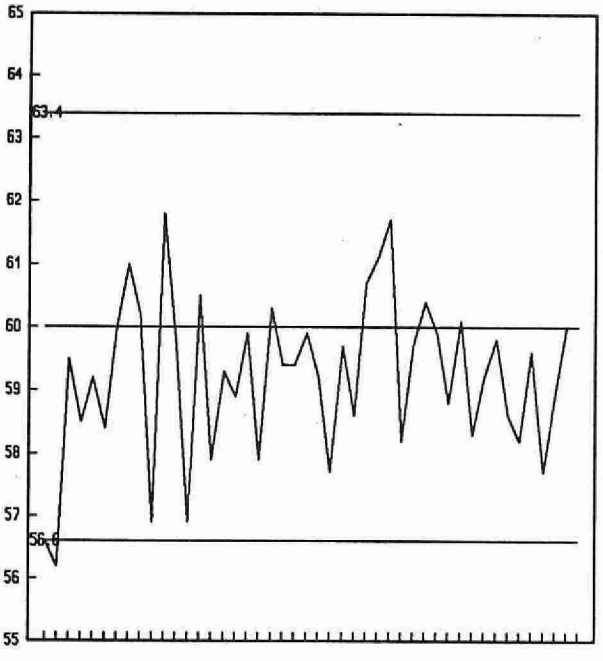
QUALITY CONTROL DATA FROM 29/04/92 TO 23/12/92



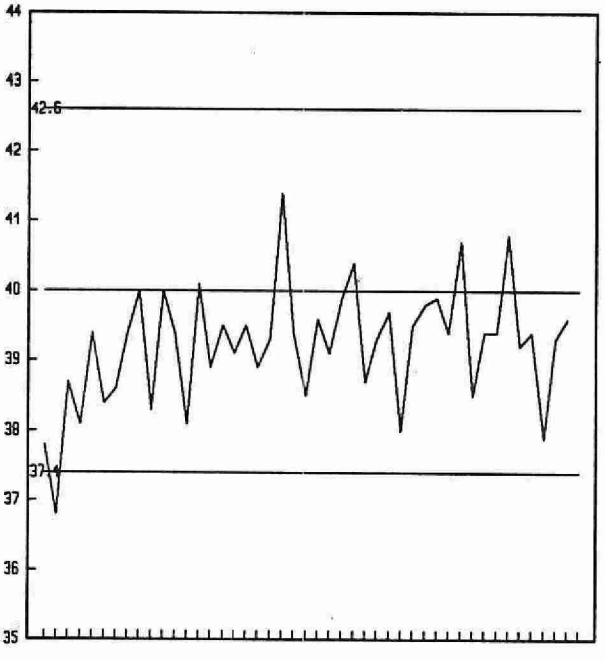
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/06/76
LIS Test Name Code	: NNHTFR	Units	: µg/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1524C2	Supervisor	: J. McBride
Method Reference No.	: E3033A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.
Approximate absorbance : 0.40 at the full scale level.
Nitrate plus nitrite is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 5.0 cm. light path at 630 nm. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration	: LTBL plus 4 QC standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 08/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 1000 µg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	77	750.0	749.8	-0.2	4.31
B :	77	250.0	250.1	0.1	5.37
A+B :	77	1000.0	999.96	-0.04	8.41
A-B :	77	500.0	499.7	-0.3	4.89
C :	77	75.0	74.4	0.1	3.01
D :	77	25.0	24.9	-0.1	2.28
C+D :	77	100.0	99.4	-0.6	4.63
C-D :	77	50.0	49.4	-0.6	2.67

s.d.(AB) S(between runs): 4.9 Sw(within run): 3.5 S/Sw: 1.4

s.d.(AB) S(between runs): 2.7 Sw(within run): 1.9 S/Sw: 1.4

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	- 1030	for	A+B
480	- 520	for	A-B
88	- 112	for	C+D
42	- 58	for	C-D

DUPLICATES:

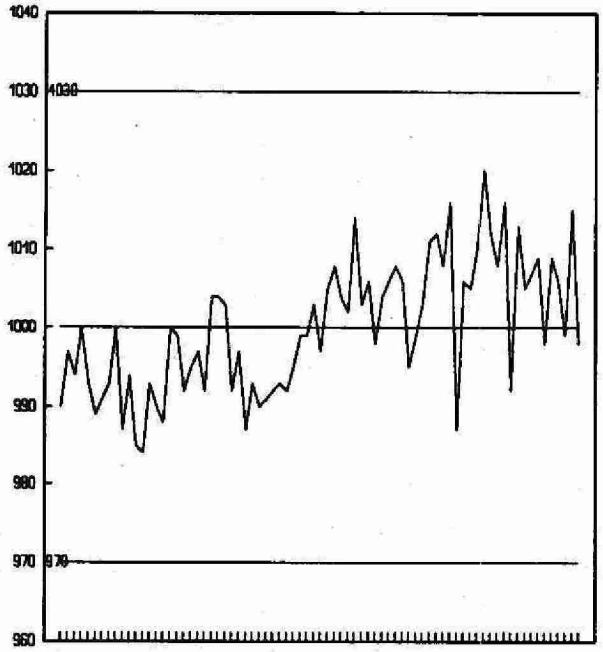
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
174	0.0	-	50.0	1.95	14.9
44	50.0	-	250.0	3.06	2.7
5	250.0	-	500.0	3.10	0.7
12	500.0	-	1000.0	6.21	0.8
276	Overall			2.28	

OTHER CHECKS:

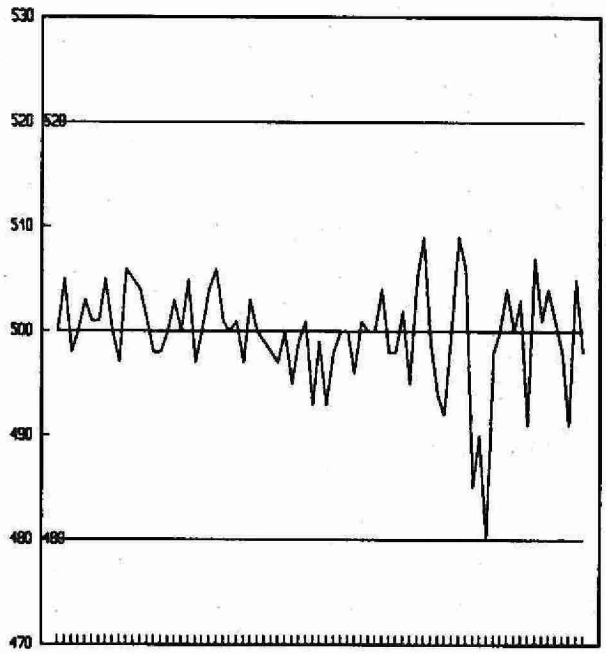
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	77	0.351	0.757

NITROGEN, AMMONIA PLUS AMMONIUM (µg/L as N)

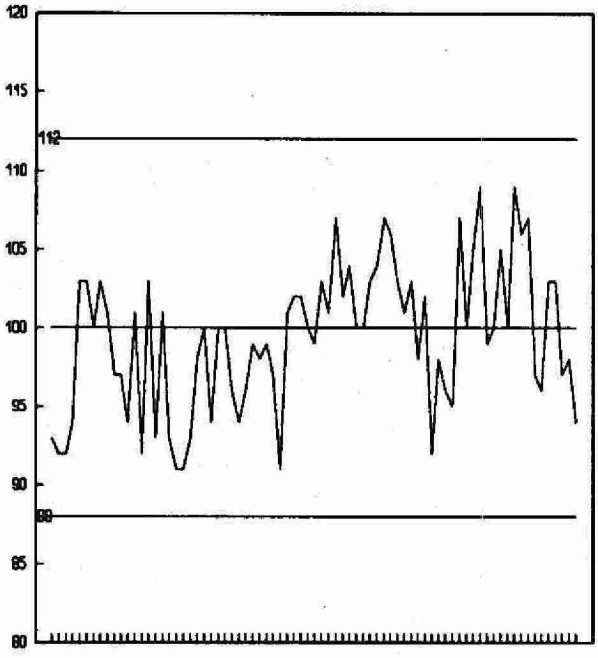
QUALITY CONTROL DATA FROM 08/01/92 TO 23/12/92



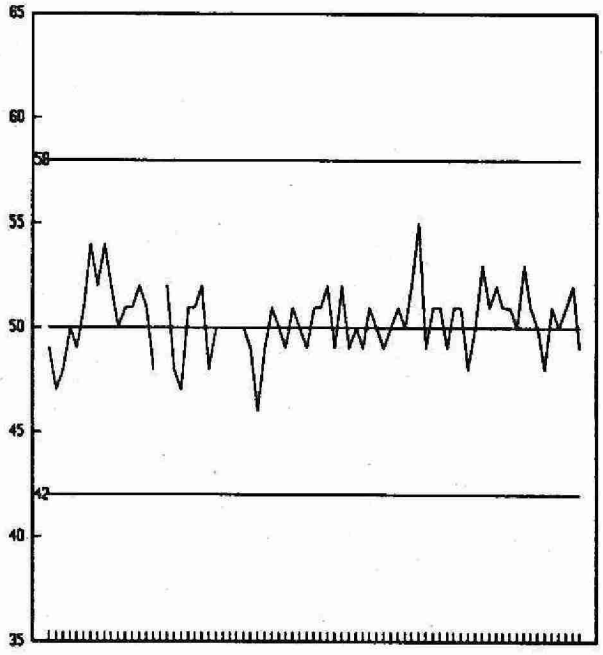
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR	Units	: µg/fltr as N
Work Station Code	: PRAM	Unit Code	: 361807
Method Code	: 004AI1	Supervisor	: M. Rawlings
Method Reference No.	: E3149A		
Sample Type/Matrix	: Dry deposition air filter extracts		

SAMPLING:

Quantity Required	: 10 mL
Container	: 50 mL Polyethylene tube

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on an extract from a dry deposition air filter via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for precipitation, throughfall, and stemflow samples is also determined at this work station.
Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37^{0}C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples.

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92

Lab: Colourimetry Analytical Range: - to 50.0 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	56	40	40.05	0.05	0.345
B :	56	20	20.09	0.09	0.253
A+B :	56	60	60.14	0.14	0.406
A-B :	56	20	19.96	-0.04	0.448
C :	56	4	4.04	0.04	0.151
B+C :	56	24	24.13	0.13	0.325
B-C :	56	16	16.04	0.04	0.221

s.d.(AB) S(between runs): 0.30 Sw(within run): 0.32 S/Sw: 0.95

s.d.(BC) S(between runs): 0.21 Sw(within run): 0.16 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

57.75	-	62.25	for	A+B
18.5	-	21.5	for	A-B
23.0	-	25.0	for	B+C
15.4	-	16.6	for	B-C

DUPLICATES:

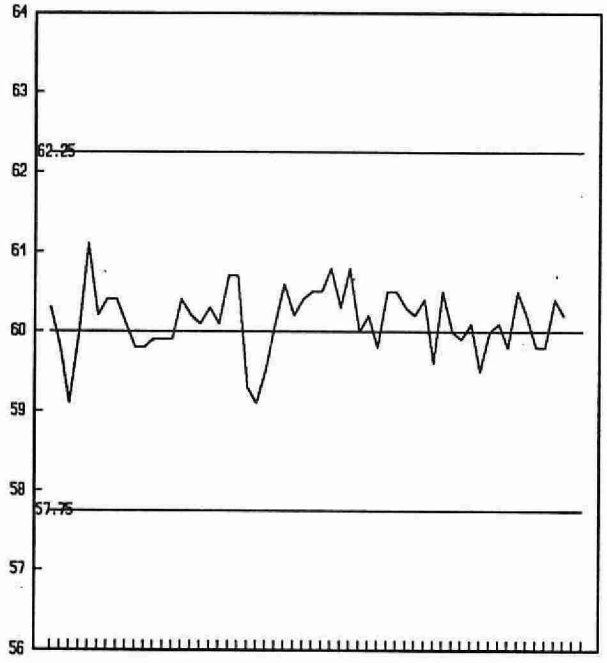
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
86	0.00	-	10.00	0.101	2.1
49	10.00	-	25.00	0.105	1.1
16	25.00	-	50.00	0.151	0.9
151	Overall			0.107	

OTHER CHECKS:

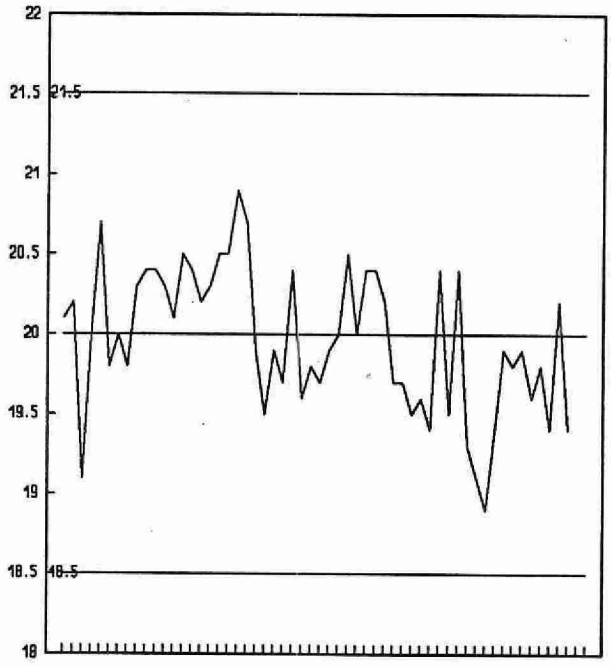
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	56	-0.088	0.517

NITROGEN, AMMONIA PLUS AMMONIUM (µg/filter as N)

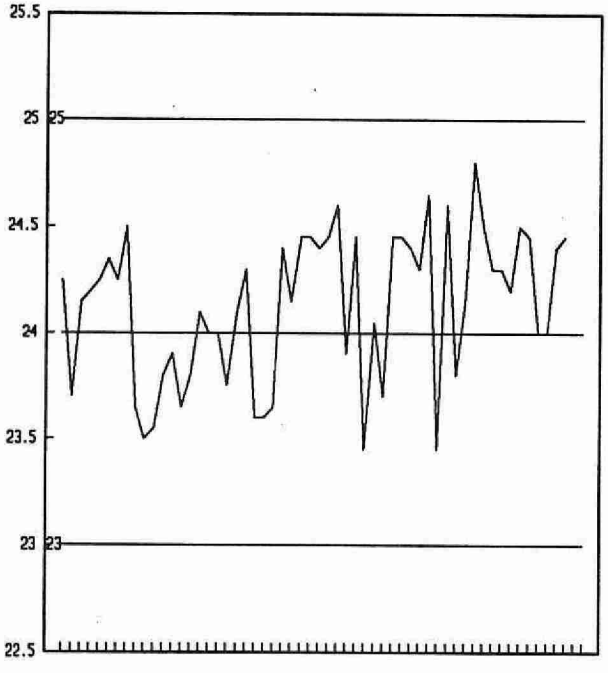
QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92



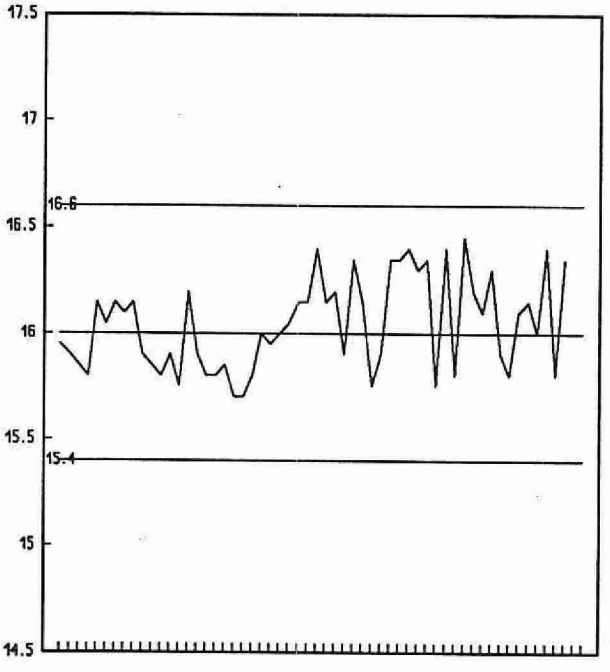
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/05/84
LIS Test Name Code	: NNHTFR, NNHTUR	Units	: mg/L as N
Work Station Code	: PRAM	Unit Code	: 064807
Method Code	: 103CC3, 003CC3	Supervisor	: M. Rawlings
Method Reference No.	: E3149A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects. Ammonia plus ammonium for dry deposition air filter extracts is also determined at this work station.

Approximate absorbance: 0.7 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 37°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5cm light path at 630 nm. Data capture, reduction and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples, standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM
(NNHTFR)

QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92

Lab: Colourimetry Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	56	1.60	1.601	0.001	0.0147
B :	56	0.80	0.802	0.002	0.0099
A+B :	56	2.40	2.403	0.003	0.0169
A-B :	56	0.80	0.799	-0.001	0.0186
C :	56	0.16	0.162	0.002	0.0060
B+C :	56	0.96	0.964	0.004	0.0186
B-C :	56	0.64	0.641	0.001	0.0140

s.d.(AB) S(between runs): 0.012 Sw(within run): 0.013 S/Sw: 0.96

s.d.(BC) S(between runs): 0.008 Sw(within run): 0.006 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	B+C
0.616	-	0.664	for	B-C

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
86	0.00	-	0.40	0.0040	2.1
49	0.40	-	1.00	0.0039	1.2
16	1.00	-	2.00	0.0141	1.0
151	Overall			0.0043	

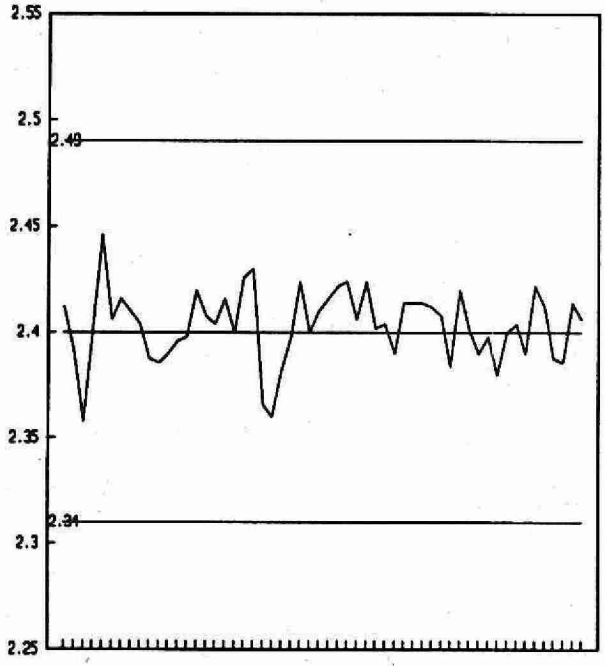
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	56	-0.0035	0.0207

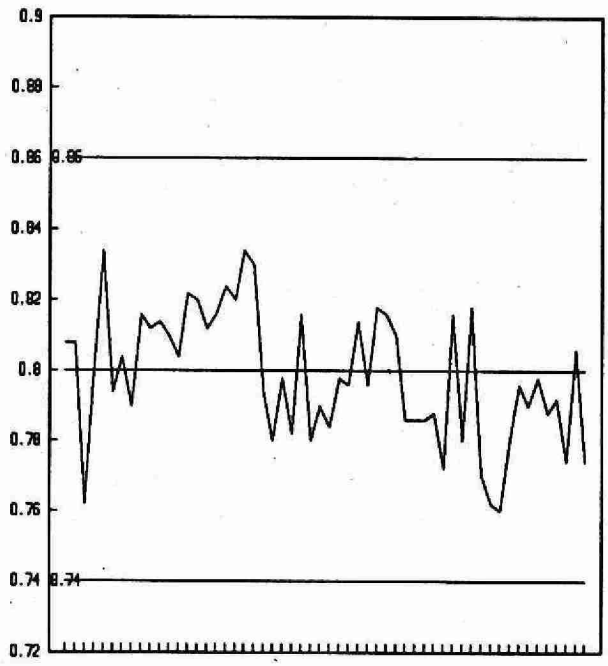
NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

(NNHTFR)

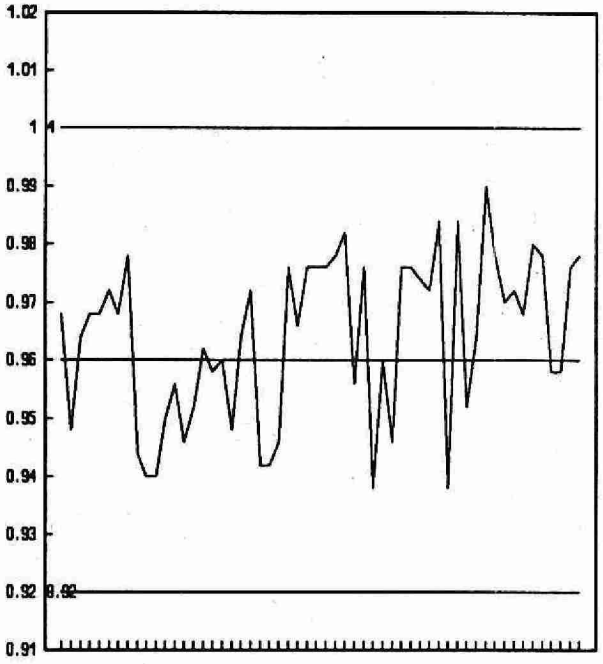
QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92



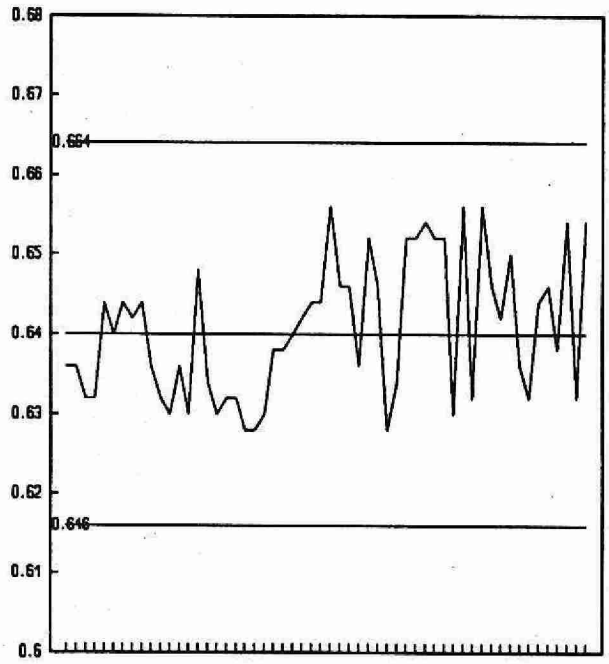
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

NITROGEN, AMMONIA PLUS AMMONIUM
(NNHTUR)

QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92

Lab: Colourimetry Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	56	1.6	1.601	0.001	0.0145
B :	56	0.8	0.802	0.002	0.0100
A+B :	56	2.4	2.404	0.004	0.0168
A-B :	56	0.8	0.808	0.008	0.0185
C :	56	0.16	0.162	0.002	0.0060
B+C :	56	0.96	0.964	0.004	0.0140
B-C :	56	0.64	0.641	0.001	0.0088

s.d.(AB) S(between runs): 0.012 Sw(within run): 0.013 S/Sw: 0.95

s.d.(BC) S(between runs): 0.008 Sw(within run): 0.006 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	B+C
0.616	-	0.664	for	B-C

DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
83	0.00	-	0.40	0.0041	2.2
52	0.40	-	1.00	0.0037	1.2
16	1.00	-	2.00	0.0141	1.0
151	Overall			0.0042	

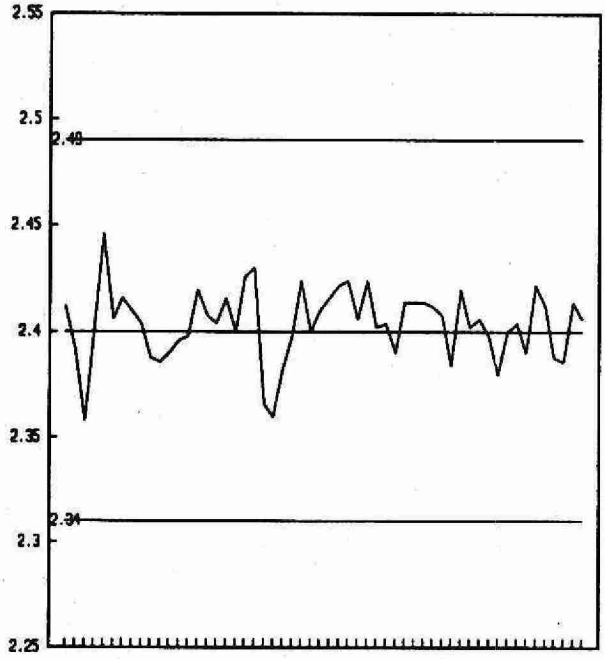
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	56	-0.0036	0.0209

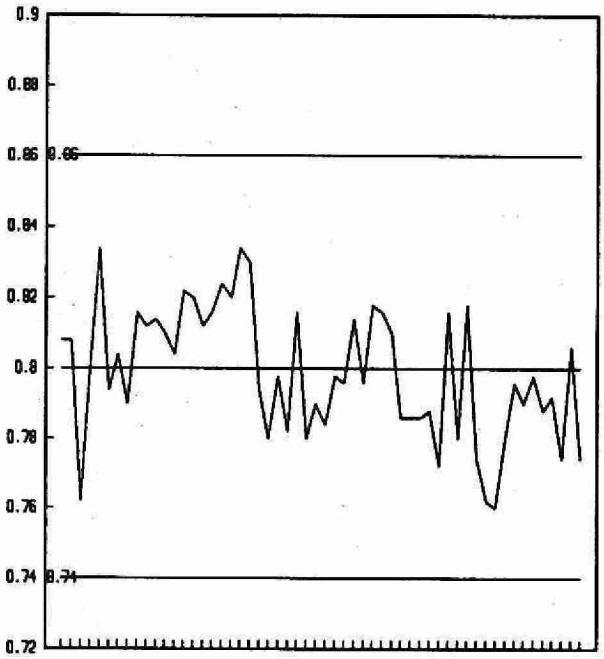
NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

(NNHTUR)

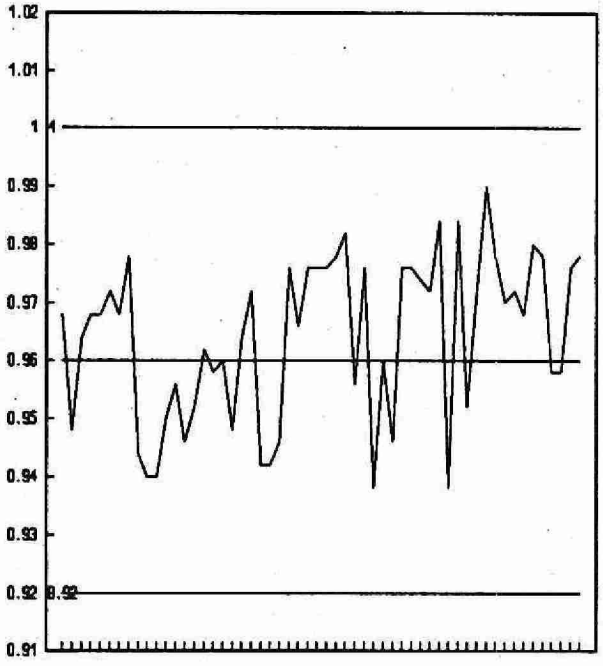
QUALITY CONTROL DATA FROM 01/01/92 TO 22/12/92



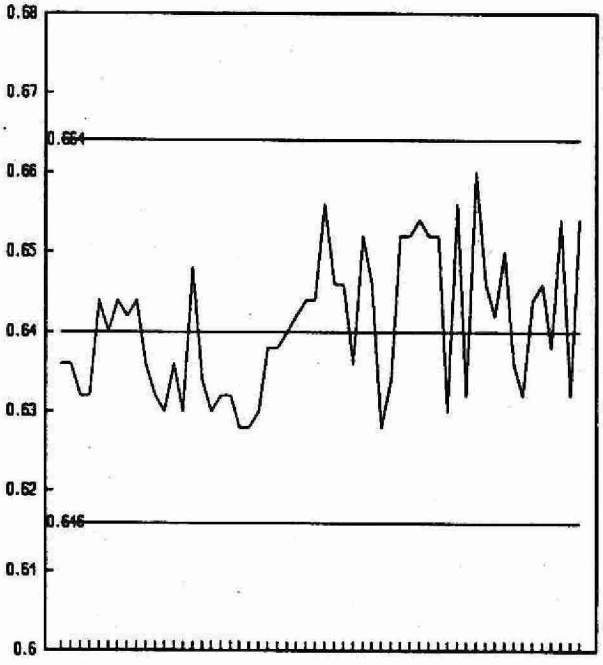
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3174A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst. A reference stream, which differs from the colour formation stream by replacement of the catalyst with an equal flow of water, is employed to suppress sample matrix effects.

Approximate absorbance: 0.5 at the full scale level.

Nitrate plus nitrite, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 2 of 38^{0}C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 14/01/92 TO 30/12/92

Lab: Colourimetry Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	105	1.6	1.601	0.001	0.0089
B :	105	0.8	0.8005	0.0005	0.0051
A+B :	105	2.4	2.401	0.001	0.0115
A-B :	105	0.8	0.8005	0.0005	0.0089
C :	105	0.16	0.159	-0.001	0.0028
B+C :	105	0.96	0.9598	-0.002	0.0065
B-C :	105	0.64	0.641	0.0012	0.0051

s.d.(AB) S(between run): 0.007 Sw(within runs): 0.006 S/Sw: 1.16

s.d.(BC) S(between run): 0.004 Sw(within runs): 0.0036 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.31	-	2.49	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.0	for	B+C
0.616	-	0.664	for	B-C

DUPLICATES:

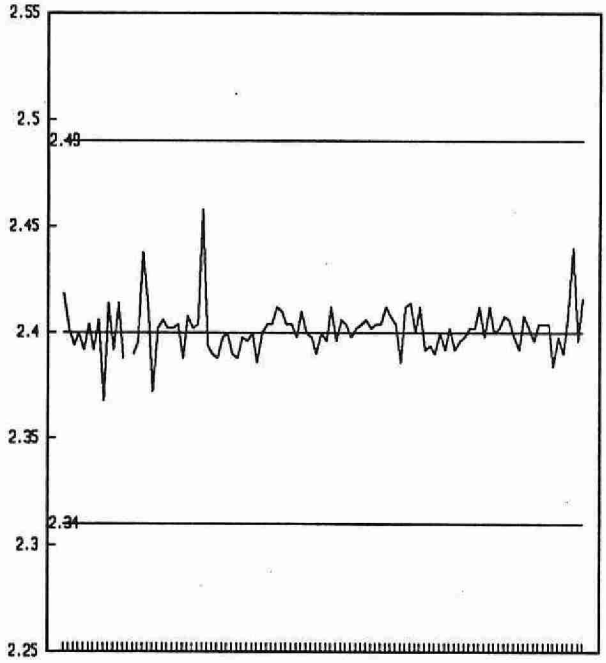
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
145	0.00	-	0.02	0.003	24.9
121	0.02	-	0.20	0.009	14.4
12	0.20	-	1.00	0.016	4.6
3	1.00	-	2.00	0.050	3.5
281	Overall			0.004	

OTHER CHECKS:

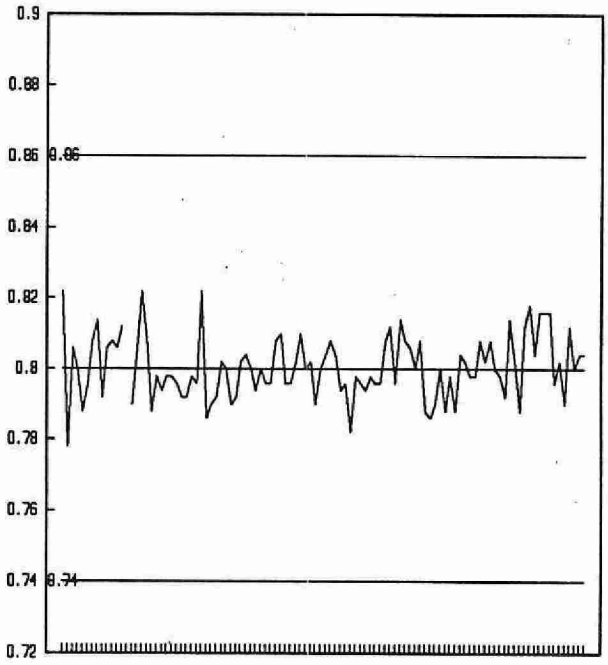
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	-0.0001	0.0024

NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

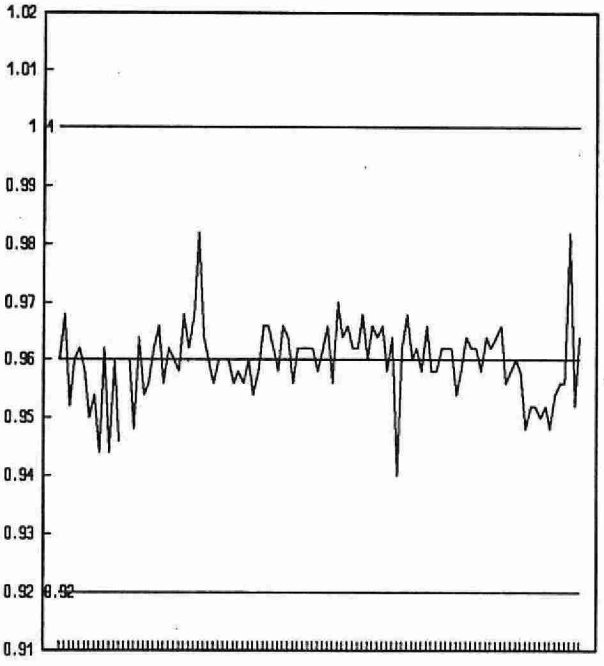
QUALITY CONTROL DATA FROM 14/01/92 TO 30/12/92



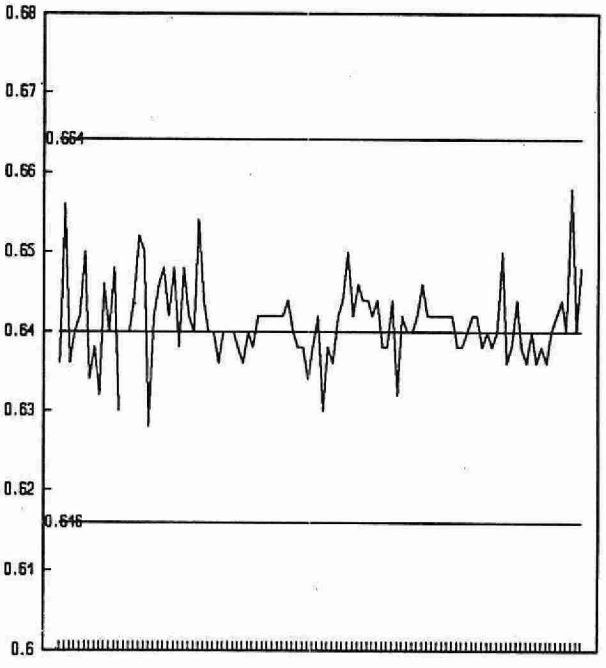
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** NITROGEN, AMMONIA PLUS AMMONIUM ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/77
LIS Test Name Code	: NNHTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 103AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3223A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ammonia plus ammonium ions are determined on the supernatant of a settled sample via the formation of indophenol blue in a buffered system using nitroprusside as a catalyst.
Approximate absorbance: 0.7 at the full scale level.
Reactive orthophosphate, nitrogen-nitrite and nitrogen-nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus one 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

NITROGEN, AMMONIA PLUS AMMONIUM

QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92

Lab: Colourimetry Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	40.0	39.992	-0.008	0.138
B :	118	20.0	20.082	0.082	0.078
A+B :	118	60.0	60.073	0.073	0.179
A-B :	118	20.0	19.909	-0.091	0.136
C :	118	4.0	3.997	-0.003	0.025
B+C :	118	24.0	24.079	0.079	0.090
B-C :	118	16.0	16.085	0.085	0.073

s.d.(AB) S(between runs): 0.112 Sw(within run): 0.096 S/Sw: 1.17

s.d.(BC) S(between runs): 0.058 Sw(within run): 0.051 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.8	-	61.2	for	A+B
19.1	-	20.9	for	A-B
23.3	-	24.7	for	B+C
15.5	-	16.5	for	B-C

DUPLICATES:

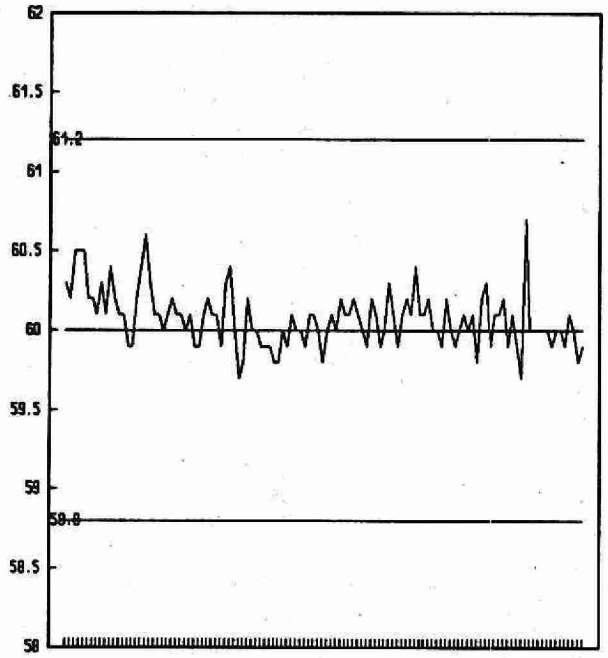
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
113	0.00	-	0.20	0.0309	51.9
45	0.20	-	2.00	0.0606	21.5
39	2.00	-	10.00	0.2865	6.2
43	10.00	-	20.00	0.4389	2.9
19	20.00	-	50.00	0.9179	3.2
259	Overall			0.2040	

OTHER CHECKS:

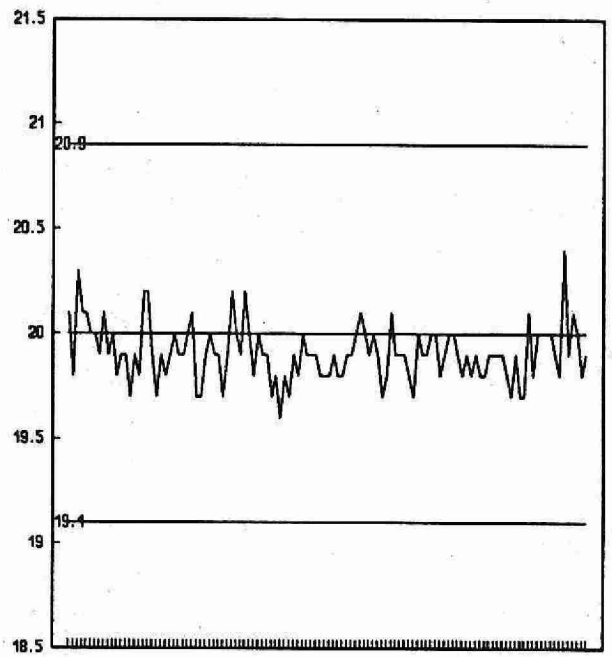
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	-0.002	0.024

NITROGEN, AMMONIA PLUS AMMONIUM (mg/L as N)

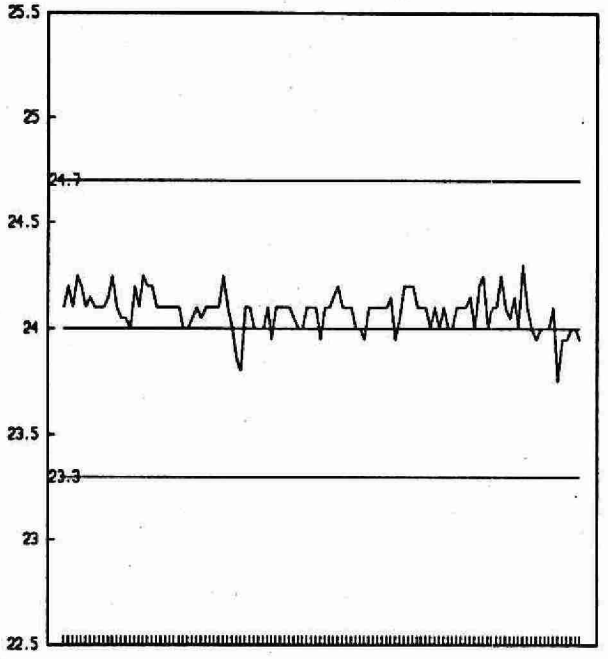
QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92



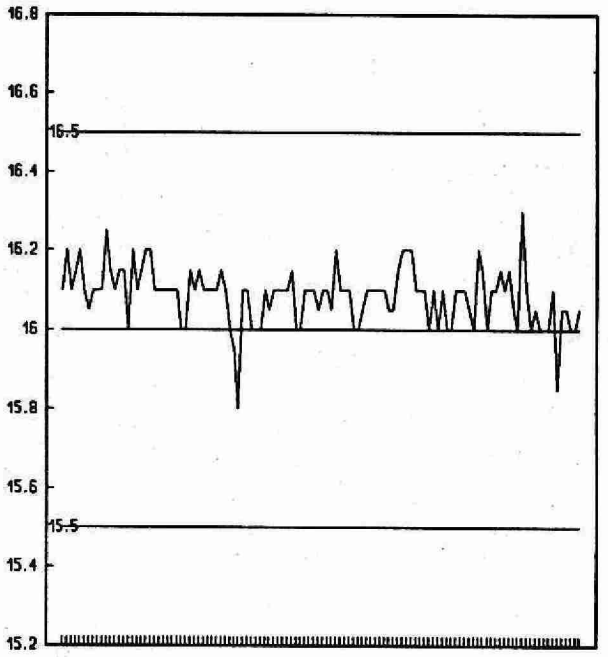
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO3UR	Units	: mg/L as N
Work Station Code	: PRIC1	Unit Code	: 064807
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards.
Sulphate and chloride are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NITROGEN, NITRATE

QUALITY CONTROL DATA FROM 16/01/92 TO 21/12/92

Lab: Ion Chromatography Analytical Range: - to 1 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	34	0.8	0.8113	0.0113	0.0134
B :	34	0.2	0.2109	0.0109	0.0086
A+B :	34	1.0	1.0223	0.0223	0.0190
A-B :	34	0.6	0.6004	0.0004	0.0121

s.d.(AB) S(between runs): 0.0112 Sw(within run): 0.0085 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.95	-	1.05	for	A+B
0.57	-	0.63	for	A-B

DUPLICATES:

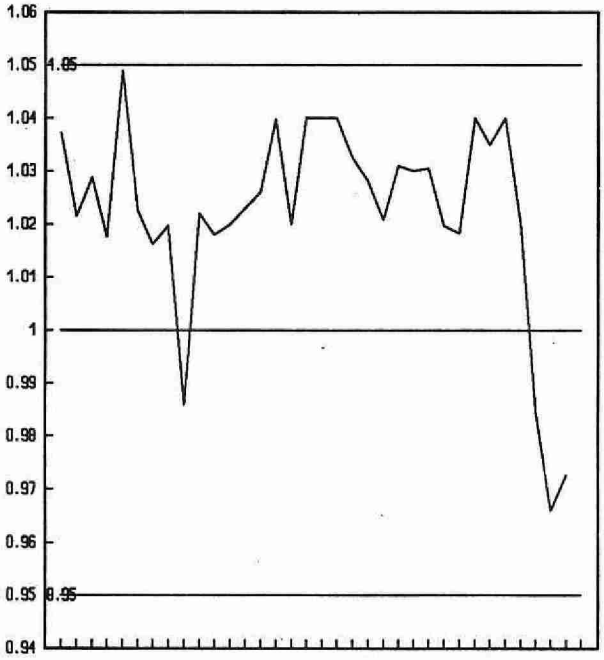
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
17	0.00	-	0.20	0.0066	6.0
37	0.20	-	0.50	0.0058	1.5
32	0.50	-	1.00	0.0087	1.1
86	Overall			0.0070	

OTHER CHECKS:

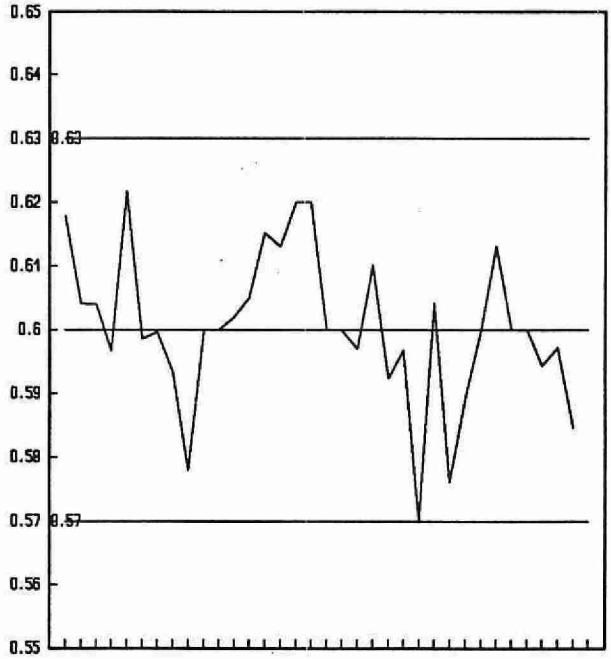
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	34	0.022	0.014

NITROGEN, NITRATE (mg/L as N)

QUALITY CONTROL DATA FROM 16/01/92 TO 21/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3UR	Units	: µg/Filter as N
Work Station Code	: PRLOV	Unit Code	: 361807
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as N.
Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN, NITRATE

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 100 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	60	80.0	79.92	-0.08	0.673
B :	60	20.0	20.12	0.12	0.402
A+B :	60	100.0	100.04	0.04	0.928
A-B :	60	60.0	59.79	-0.21	0.607

s.d.(AB) S(between runs): 0.55 Sw(within run): 0.43 S/Sw: 1.29

On any given day the calibration is accepted if the values obtained lie within the ranges:

96	- 104	for	A+B
57	- 63	for	A-B

DUPLICATES:

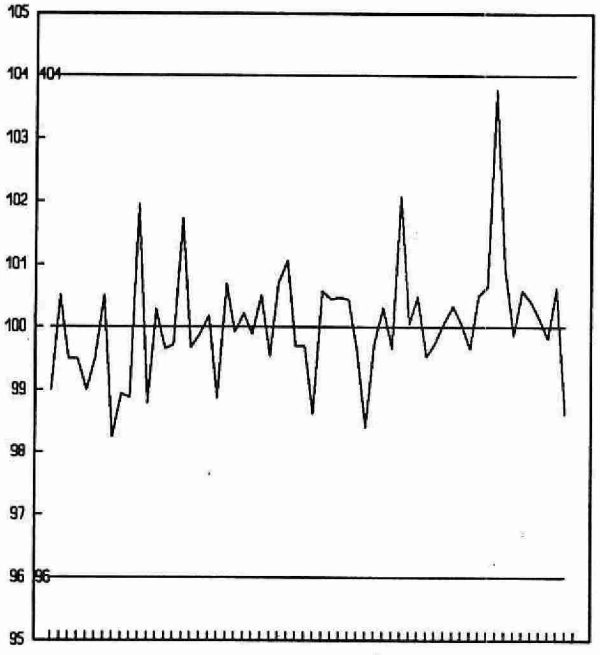
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
35	0.0 - 25.0	0.191	2.3
9	25.0 - 50.0	0.293	0.9
8	50.0 - 100.0	0.376	0.5
52	Overall	0.247	

OTHER CHECKS:

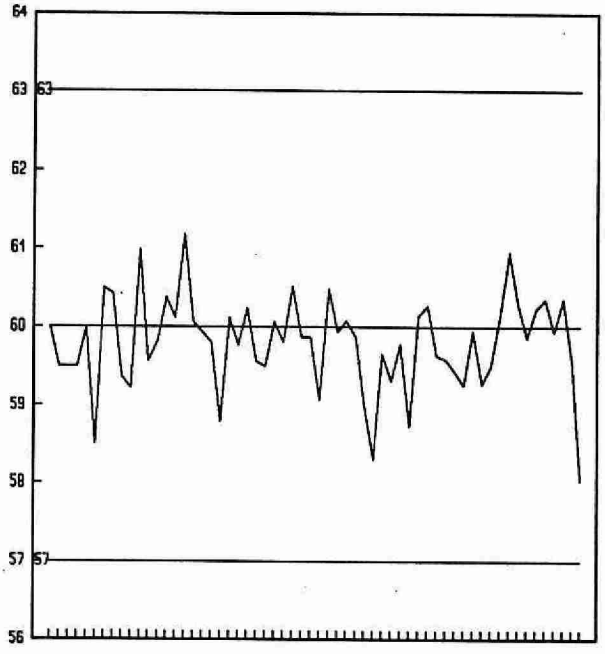
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	60	0.027	0.148

NITROGEN, NITRATE (µg/filter as N)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** NITROGEN, NITRATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: NNO3FR,NNRICF	Units	: µg/Filter as N
Work Station Code	: PRSEQ	Unit Code	: 361807
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: Nylon (NNRICF) filter from LoVol and sequential filter packs, and Teflon (NN03FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Nitrate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of nitrate in mg/L as N is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as N.
Chloride and sulphate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1.0

CALIBRATION:

LTBL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

NITROGEN, NITRATE
(NNO3FR)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 50 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	61	40.0	39.79	-0.21	0.307
B :	61	10.0	10.02	0.02	0.187
A+B :	61	50.0	49.81	-0.19	0.400
A-B :	61	30.0	29.78	-0.22	0.314

s.d.(AB) S(between runs): 0.25 Sw(within run): 0.22 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

48.3	-	51.7	for	A+B
28.8	-	31.2	for	A-B

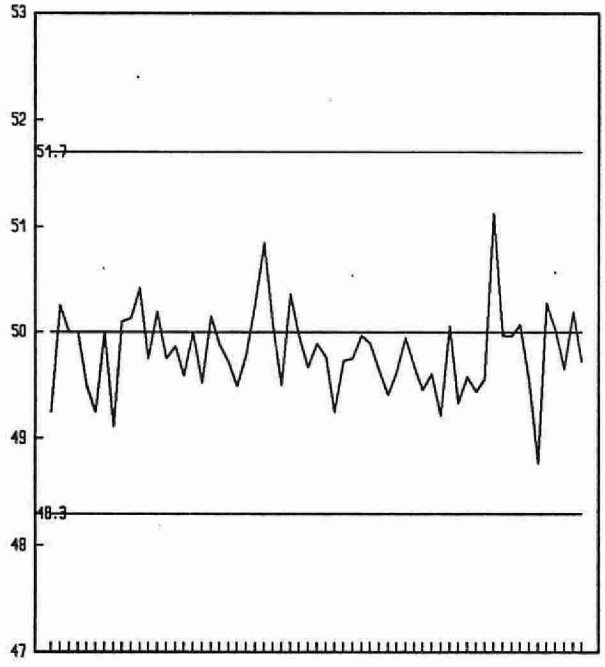
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
66	0.0	-	5.0	0.058	16.4
11	5.0	-	25.0	0.119	0.9
1	25.0	-	50.0	N.A.	N.A.
78	Overall			0.069	

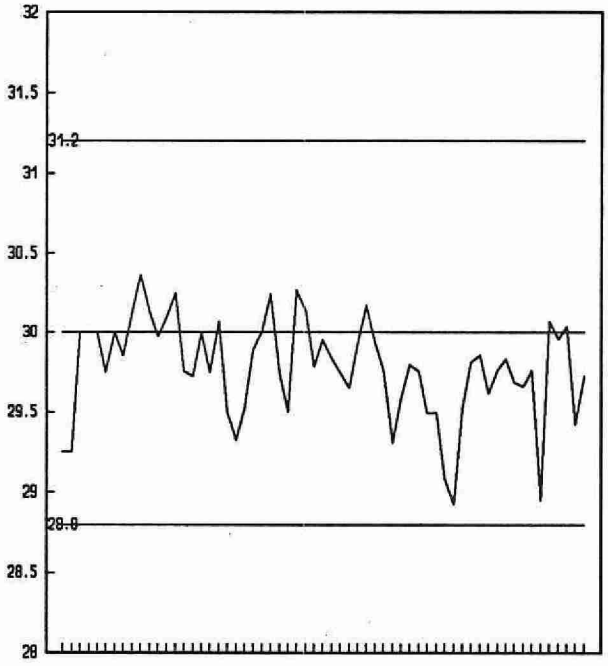
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	61	0.029	0.103

NITROGEN, NITRATE (µg/filter as N)
(NNO3FR)
QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

NITROGEN, NITRATE
(NNRICF)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 50 µg/filter as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	60	40.0	39.81	-0.19	0.327
B :	60	10.0	10.02	0.02	0.189
A+B :	60	50.0	49.83	-0.17	0.421
A-B :	60	30.0	29.79	-0.21	0.328

s.d.(AB) S(between runs): 0.27 Sw(within run): 0.23 S/Sw: 1.15

On any given day the calibration is accepted if the values obtained lie within the ranges:

48.3	-	51.7	for	A+B
28.8	-	31.2	for	A-B

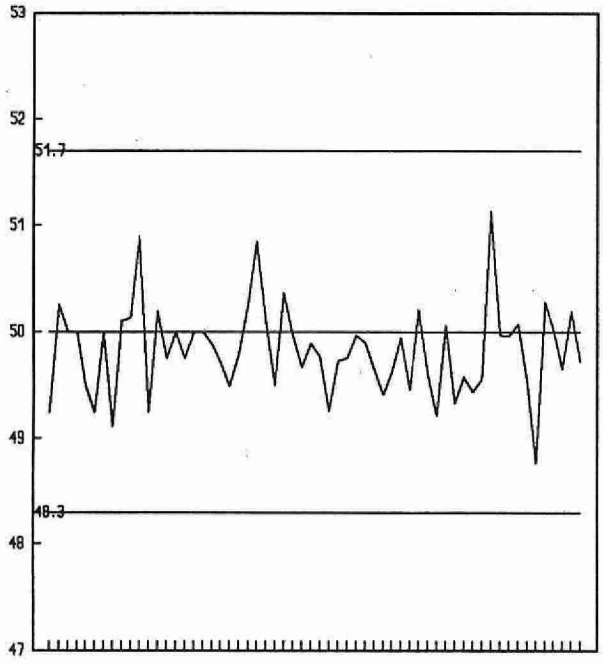
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
29	0.0	-	1.5	0.066	7.7
28	1.5	-	5.0	0.070	6.0
45	5.0	-	50.0	0.138	1.5
102	Overall			0.096	

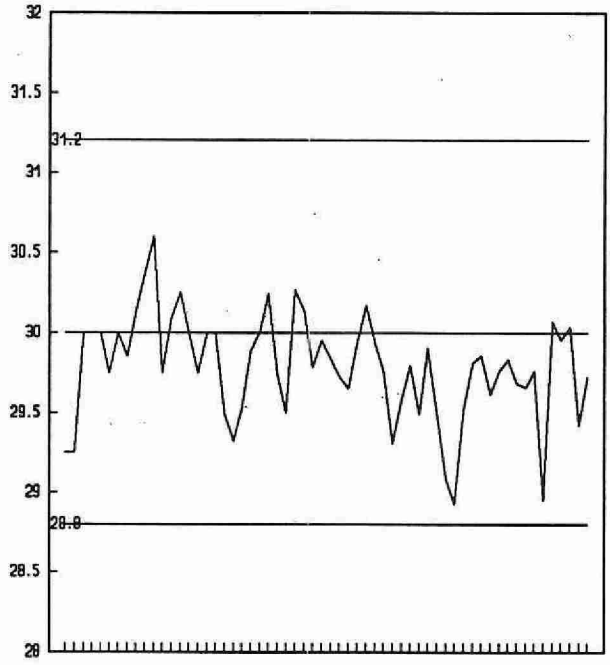
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	60	0.033	0.116

NITROGEN, NITRATE (µg/filter as N)
(NNRICF)
QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 13/06/78
LIS Test Name Code	: NNOTFR	Units	: µg/L as N
Work Station Code	: DONUT	Unit Code	: 063807
Method Code	: 1525C2	Supervisor	: J. McBride
Method Reference No.	: E303A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Soil Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a sample. Nitrate is reduced to nitrite in alkaline media at 37^{0}C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-napthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.
Approximate absorbance : 0.4 at the full scale level.
Ammonia plus ammonium is determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37^{0}C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 5.0 cm. light path at 520 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

BL plus 8 standards

CONTROLS:

Calibration	: LTBL plus 4 QC standards, e.g. QCA
Drift	: BL every 10 samples and BL plus check standard every 20 samples.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 08/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 1000 µg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	77	750.0	753.3	3.3	6.16
B :	77	250.0	251.5	1.5	3.50
A+B :	77	1000.0	1004.9	4.9	8.63
A-B :	77	500.0	501.8	1.8	5.10
C :	77	75.0	74.7	-0.3	2.11
D :	77	25.0	24.4	-0.6	1.30
C+D :	77	100.0	99.1	-0.9	3.10
C-D :	77	50.0	50.3	0.3	1.63

s.d.(AB) S(between runs): 5.0 Sw(within run): 3.6 S/Sw: 1.4

s.d.(AB) S(between runs): 1.7 Sw(within run): 1.2 S/Sw: 1.5

On any given day the calibration is accepted if the values obtained lie within the ranges:

970	- 1030	for	A+B
480	- 520	for	A-B
88	- 112	for	C+D
42	- 58	for	C-D

DUPLICATES:

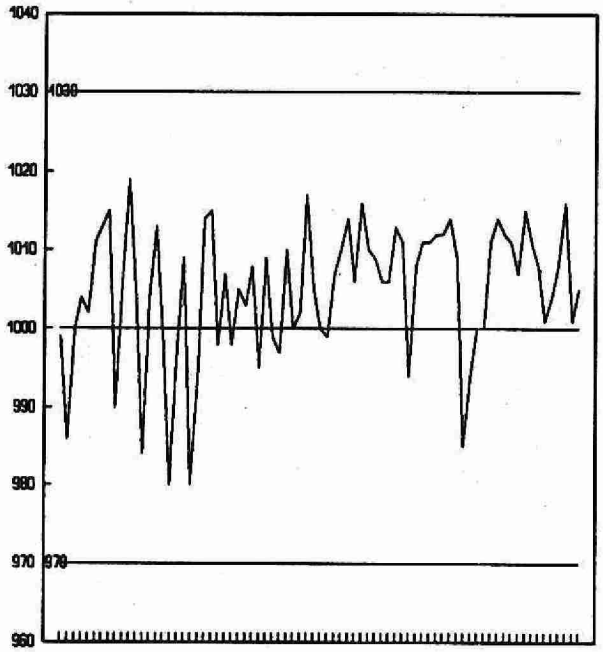
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
112	0.0	-	50.0	1.38	8.9
46	50.0	-	100.0	3.74	5.0
61	100.0	-	250.0	4.08	2.8
5	250.0	-	500.0	4.89	1.8
0	500.0	-	1000.0	N.A.	N.A.
224	Overall			2.73	

OTHER CHECKS:

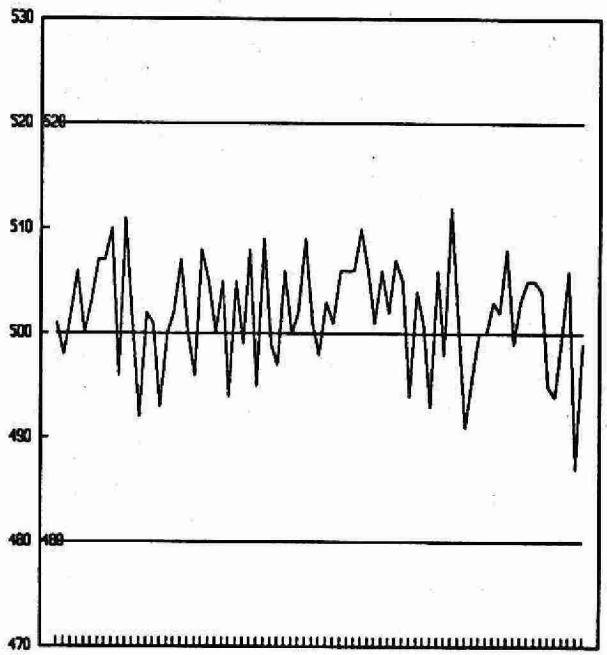
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	75	0.027	0.162

NITROGEN, NITRATE PLUS NITRITE (µg/L as N)

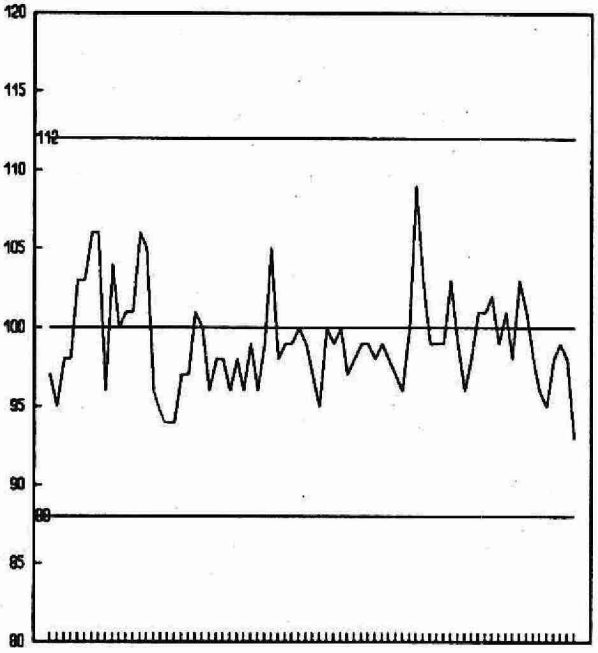
QUALITY CONTROL DATA FROM 08/01/92 TO 23/12/92



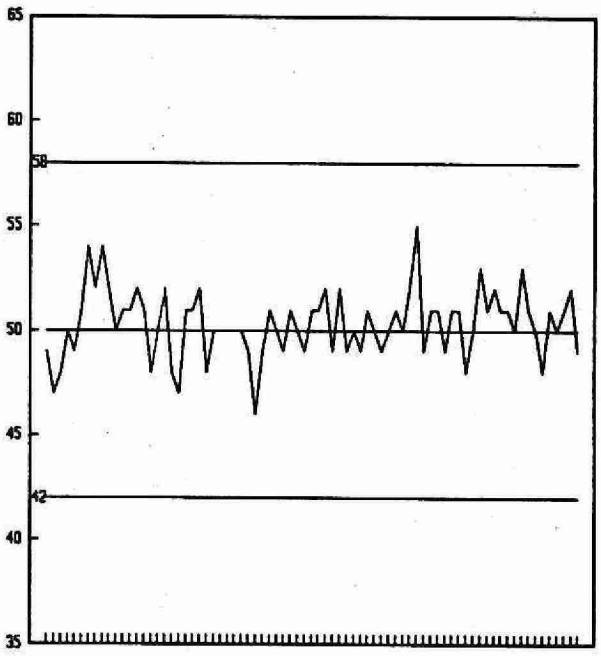
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 102DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3208A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-napthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.6 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 14/01/92 TO 30/12/92

Lab: Colourimetry Analytical Range: - to 5.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	105	4.0	4.003	0.003	0.022
B :	105	2.0	2.008	0.008	0.017
A+B :	105	6.0	6.011	0.011	0.033
A-B :	105	2.0	1.995	-0.005	0.019
C :	105	0.4	0.401	0.001	0.007
B+C :	105	2.4	2.409	0.009	0.021
B-C :	105	1.6	1.607	0.007	0.014

s.d.(AB) Sw(between run): 0.019 S(within runs): 0.013 S/Sw: 1.4

s.d.(BC) Sw(between run): 0.010 S(within runs): 0.013 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

5.77	-	6.23	for	A+B
1.85	-	2.15	for	A-B
2.30	-	2.50	for	B+C
1.54	-	1.66	for	B-C

DUPLICATES:

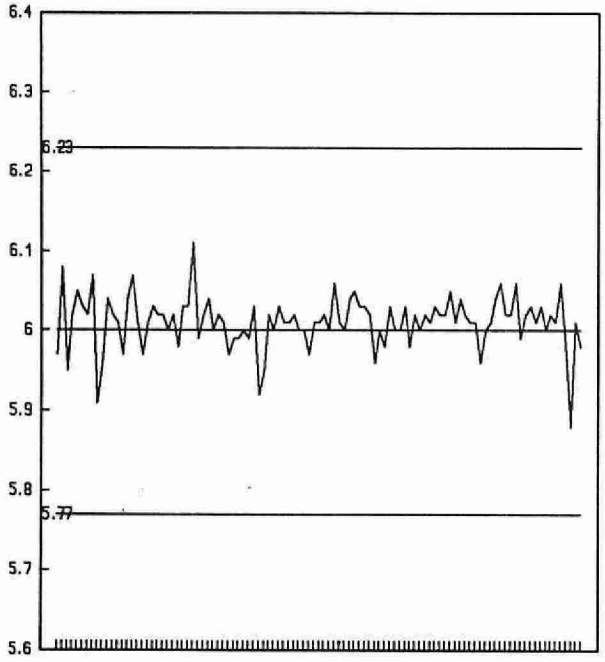
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
108	0.00	-	0.20	0.0050	10.9
120	0.20	-	1.00	0.0069	4.5
43	1.00	-	2.50	0.0182	1.0
23	2.50	-	5.00	0.0301	1.0
296	Overall			0.0086	

OTHER CHECKS:

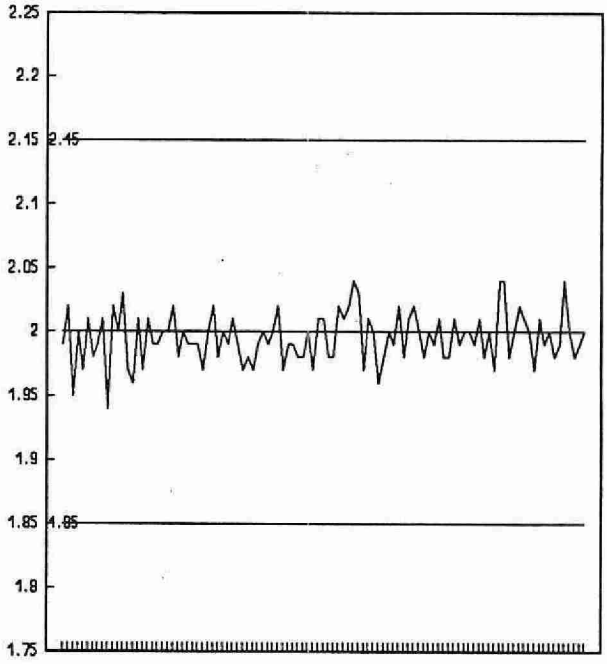
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	-0.0013	0.005

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

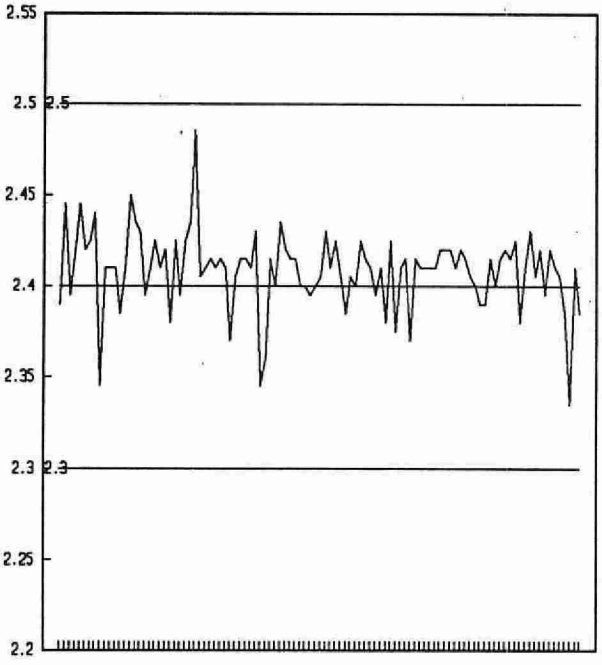
QUALITY CONTROL DATA FROM 14/01/92 TO 30/12/92



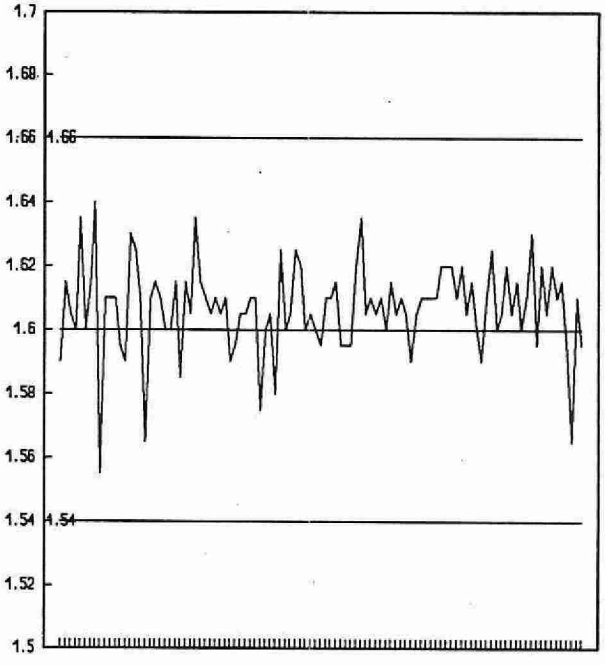
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNOTFR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3193A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-napthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step. Approximate absorbance: 0.7 at the full scale level.

Ammonia plus ammonium, nitrite, and reactive phosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 38°C heating bath (7.7 mL delay). Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Two analytical ranges are obtained from the output of the colourimeter. Data capture, reduction, and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92

Lab: Colourimetry Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	40.0	40.071	0.071	0.234
B :	118	20.0	20.161	0.161	0.147
A+B :	118	60.0	60.232	0.232	0.284
A-B :	118	20.0	19.910	-0.090	0.268
C :	118	4.0	3.996	-0.004	0.035
B+C :	118	24.0	24.157	0.157	0.167
B-C :	118	16.0	16.165	0.165	0.133

s.d.(AB) S(between runs): 0.195 Sw(within run): 0.190 S/Sw: 1.03

s.d.(BC) S(between runs): 0.107 Sw(within run): 0.094 S/Sw: 1.13

On any given day the calibration is accepted if the values obtained lie within the ranges:

58.7	-	61.3	for	A+B
19.0	-	21.0	for	A-B
23.3	-	24.7	for	B+C
15.5	-	16.5	for	B-C

DUPLICATES:

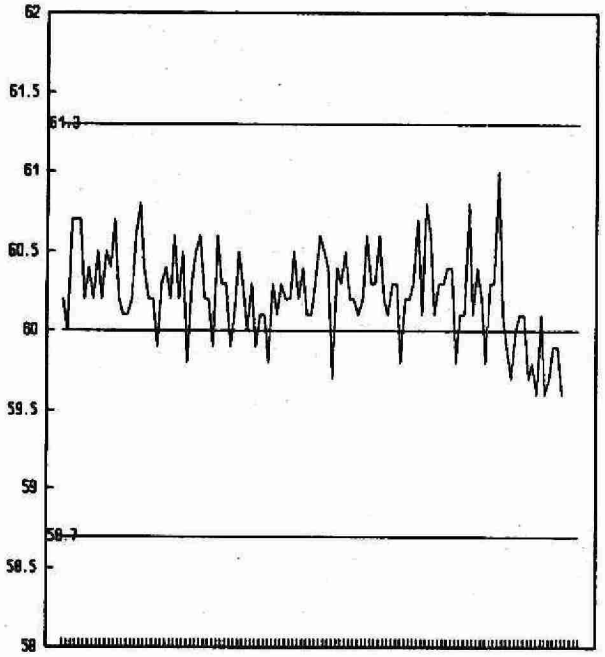
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
156	0.00	-	5.00	0.0327	13.1
86	5.00	-	10.00	0.1062	1.8
54	10.00	-	25.00	0.2204	0.7
0	25.00	-	50.00	N.A.	N.A.
296	Overall			0.0441	

OTHER CHECKS:

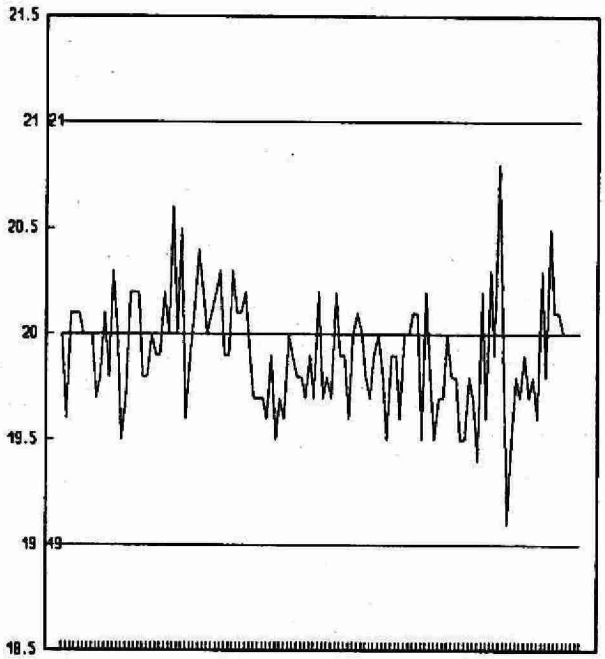
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	-0.003	0.022

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

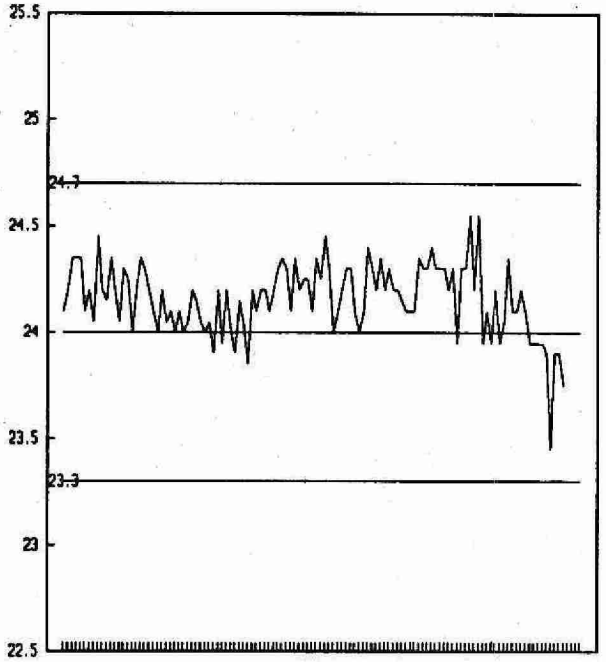
QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92



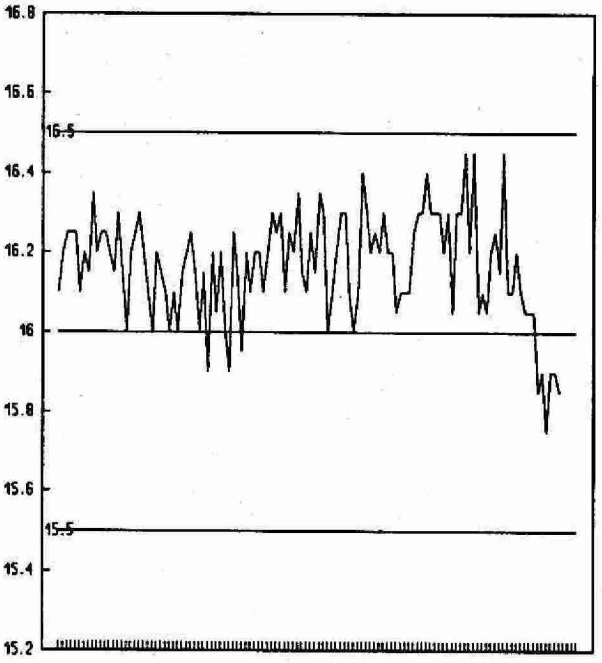
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, NITRATE PLUS NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/76
LIS Test Name Code	: NNOTUR	Units	: mg/L as N
Work Station Code	: WFNO3	Unit Code	: 064807
Method Code	: 002CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3220A		
Sample Type/Matrix	: Ministry of Health Water Samples		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrate plus nitrite is determined on the supernatant of a settled sample. Nitrate is reduced to nitrite in alkaline media at 38°C, by hydrazine sulphate with copper as a catalyst. Colourimetry is based on the formation of an azo dye by nitrite, sulphanilamide, and N(1-napthyl) ethylenediamine dihydrochloride. To control metal ion interference, samples are passed through an ion-exchange column prior to the reduction step.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus the following modules: 37°C heating bath (7.7 mL delay), ion exchange column. Colourimetric measurement is through a 1.5 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 6 standards

CONTROLS:

Calibration	: 2 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRATE PLUS NITRITE

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92

Lab: Colourimetry Analytical Range: - to 20.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	87	16.0	15.970	-0.030	0.116
B :	87	8.0	8.022	0.022	0.091
A+B :	87	24.0	23.972	-0.028	0.157
A-B :	87	8.0	7.968	-0.032	0.138
C :	87	1.6	1.598	-0.002	0.040
B+C :	87	9.6	9.600	0.000	0.103
B-C :	87	6.4	6.405	0.005	0.096

s.d.(AB) S(between runs): 0.104 Sw(within run): 0.098 S/Sw: 1.1

s.d.(BC) S(between runs): 0.071 Sw(within run): 0.068 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.2	- 24.8	for	A+B
7.4	- 8.6	for	A-B
9.2	- 10.0	for	B+C
5.96	- 6.84	for	B-C

DUPLICATES:

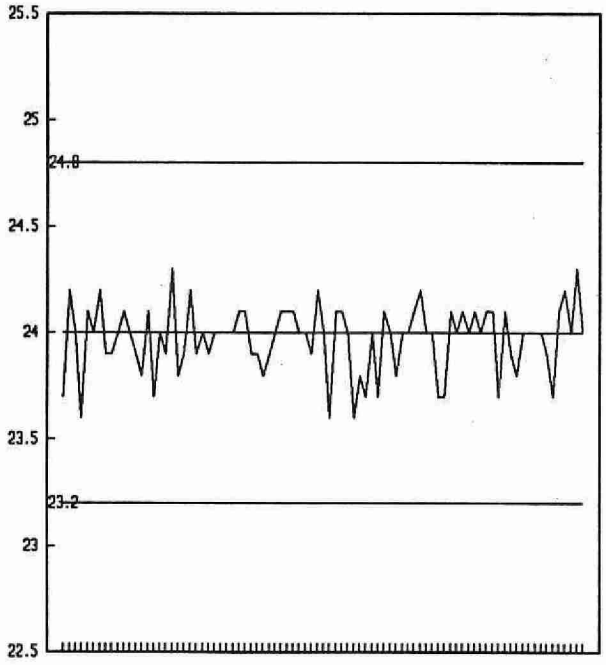
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
141	0.00 - 4.00	0.073	7.7
31	4.00 - 10.00	0.072	2.5
15	10.00 - 20.00	0.149	0.9
189	Overall	0.098	

OTHER CHECKS:

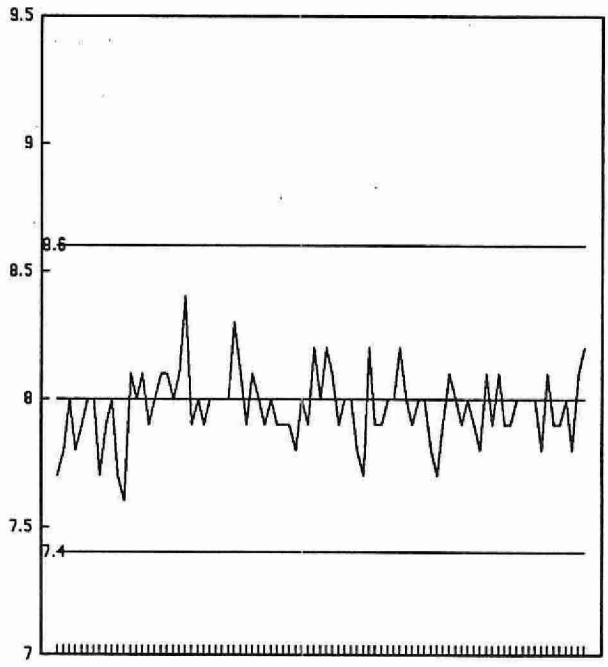
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	87	0.0011	0.032

NITROGEN, NITRATE PLUS NITRITE (mg/L as N)

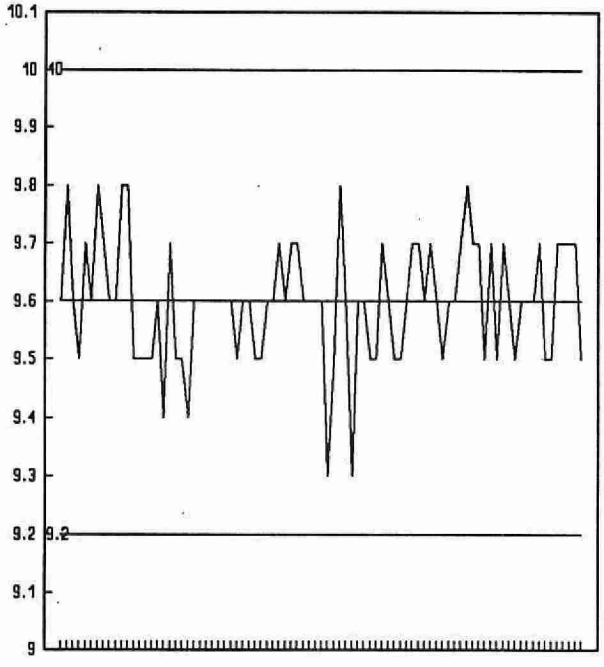
QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92



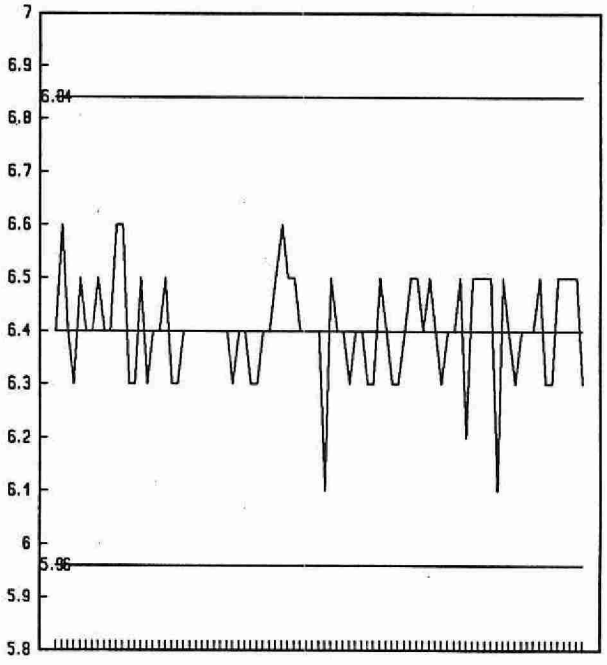
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: RNDNP	Unit Code	: 064807
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3175A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-napthyl) ethylenediamine dihydrochloride.
Approximate absorbance: 0.6 at the full scale level.
Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NITROGEN, NITRITE

QUALITY CONTROL DATA FROM 14/01/92 TO 30/12/92

Lab: Colourimetry Analytical Range: - to 0.200 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	105	0.16	0.1599	-0.0001	0.0013
B :	105	0.08	0.0797	-0.0003	0.0007
A+B :	105	0.24	0.2395	-0.0005	0.0018
A-B :	105	0.08	0.0803	0.0003	0.0013
C :	105	0.016	0.0159	-0.0001	0.0004
B+C :	105	0.096	0.0956	-0.0004	0.0009
B-C :	105	0.064	0.0637	-0.0003	0.0007

s.d.(AB) S(between run): 0.0010 Sw(within runs): 0.0009 S/Sw: 1.2

s.d.(BC) S(between run): 0.0006 Sw(within runs): 0.0005 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.231	-	0.249	for	A+B
0.074	-	0.086	for	A-B
0.092	-	0.100	for	B+C
0.061	-	0.067	for	B-C

DUPLICATES:

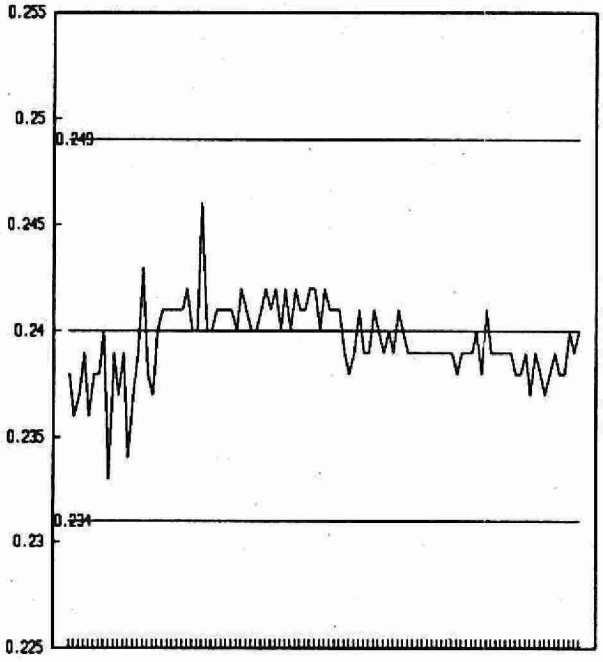
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
140	0.000	-	0.004	0.00072	51.9
86	0.004	-	0.010	0.00110	17.3
79	0.010	-	0.100	0.00144	10.4
4	0.100	-	0.200	0.00103	6.5
309	Overall				

OTHER CHECKS:

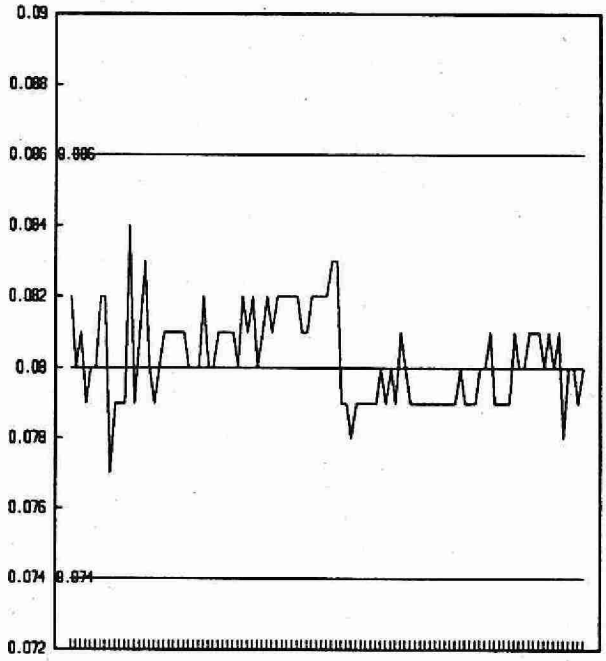
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	0.00003	0.0004

NITROGEN, NITRITE (mg/L AS N)

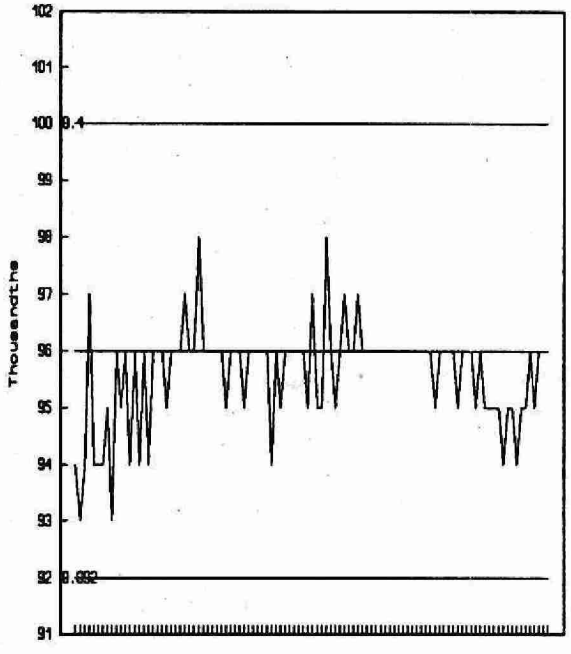
QUALITY CONTROL DATA FROM 14/01/92 TO 30/12/92



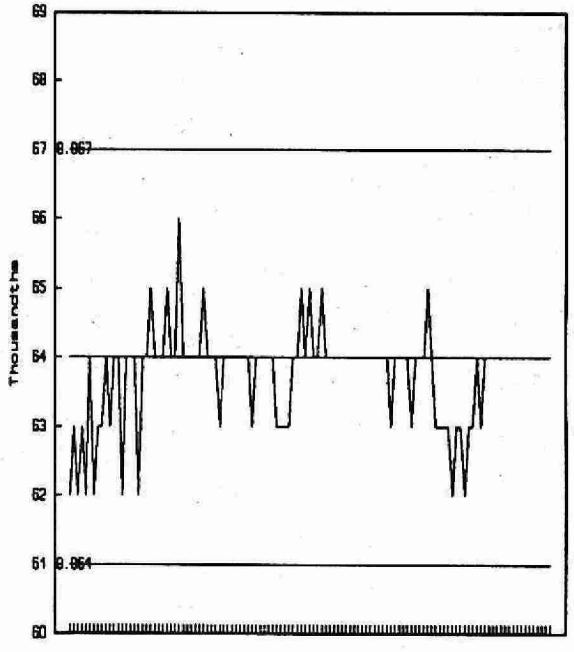
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** NITROGEN, NITRITE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/78
LIS Test Name Code	: NNO2FR	Units	: mg/L as N
Work Station Code	: SDNP	Unit Code	: 064807
Method Code	: 102CC2	Supervisor	: M. Rawlings
Method Reference No.	: E3193A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Nitrite is determined on the supernatant of a settled sample by formation of an azo dye using sulphanilamide, and N(1-napthyl) ethylenediamine dihydrochloride.
Approximate absorbance: 0.3 at the full scale level.
Ammonia plus ammonium, nitrate plus nitrite, and reactive orthophosphate are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 520 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples
Interference	: Nitrate standard spiked with calcium (150 mg/L) and magnesium (50 mg/L) confirms effective interference suppression.
Recovery	: Individual nitrate and nitrite standards of equal N concentration show effectiveness of reduction step.

NOTES:

Quality Control limits were changed in July 1992. QC data prior to this date were under the control of former limits.

NITROGEN, NITRITE

QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92

Lab: Colourimetry Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	1.6	1.5979	-0.0021	0.0084
B :	118	0.8	0.7994	-0.0006	0.0076
A+B :	118	2.4	2.3972	-0.0028	0.0139
A-B :	118	0.8	0.7985	-0.0015	0.0078
C :	118	0.16	0.1592	-0.0008	0.0023
B+C :	118	0.96	0.9585	-0.0015	0.0089
B-C :	118	0.64	0.6402	0.0002	0.0068

s.d.(AB) S(between runs): 0.0080 Sw(within run): 0.0055 S/Sw: 1.45

s.d.(BC) S(between runs): 0.0056 Sw(within run): 0.0048 S/Sw: 1.16

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.35	-	2.45	for	A+B
0.76	-	0.84	for	A-B
0.94	-	0.98	for	B+C
0.62	-	0.66	for	B-C

DUPLICATES:

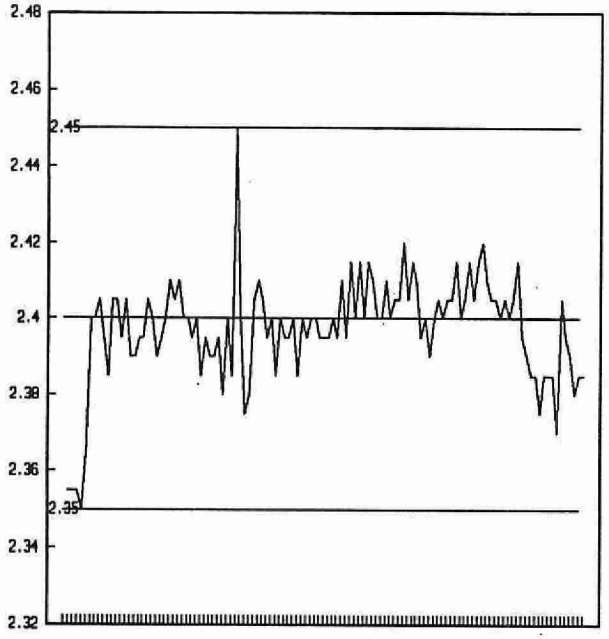
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
221	0.00	-	0.10	0.0035	24.5
65	0.10	-	1.00	0.0176	10.0
6	1.00	-	2.00	0.0256	2.6
292	Overall			0.0050	

OTHER CHECKS:

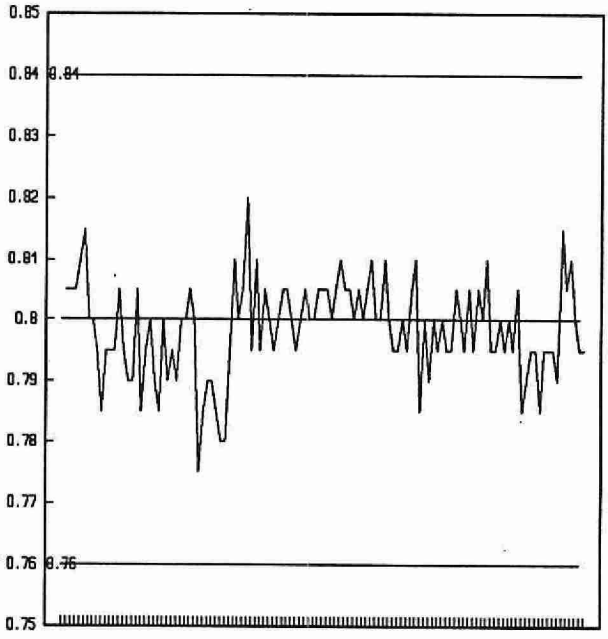
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	0.0004	0.0015

NITROGEN, NITRITE (mg/L as N)

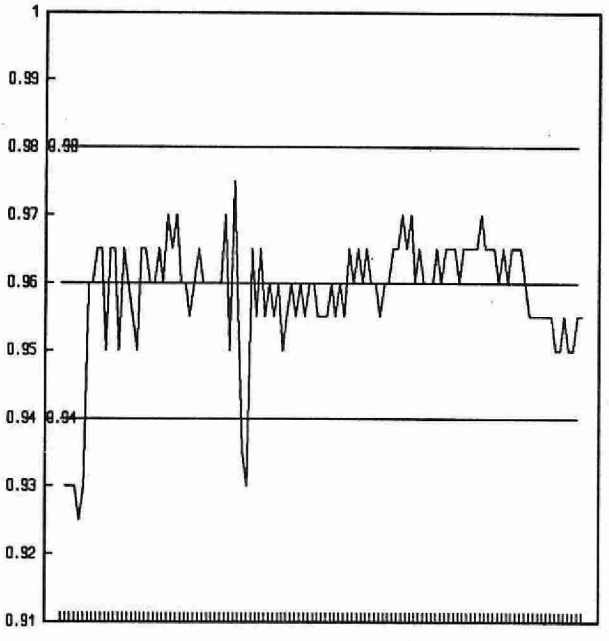
QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92



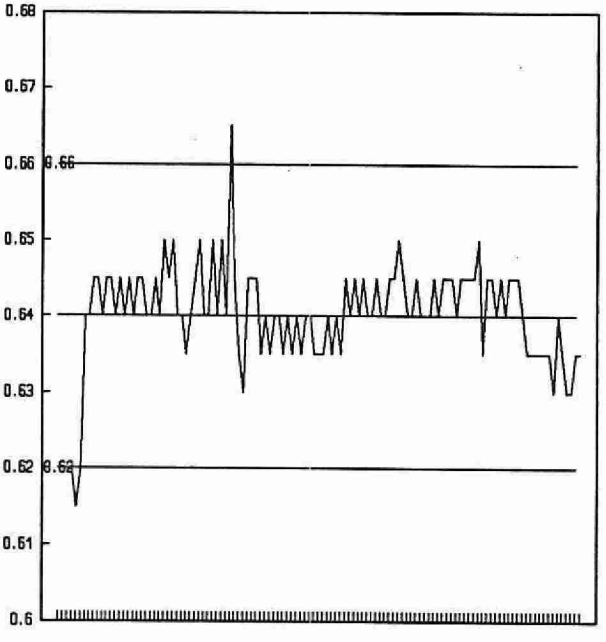
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, TOTAL KJELDAHL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: RTNP	Unit Code	: 064807
Method Code	: 004AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3180A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 0.3 at the full scale level.

Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters

Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay).

Coulourimetric measurement is through a 5.0 cm. light path at 630 nm.

Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration	: LTBL plus 3 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

NITROGEN, TOTAL KJELDAHL

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 2.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	131	1.6	1.602	0.002	0.0108
B :	131	0.8	0.8005	0.0005	0.0096
A+B :	131	2.4	2.402	0.002	0.0167
A-B :	131	0.8	0.801	0.001	0.0119
C :	131	0.16	0.159	-0.001	0.0065
B+C :	131	0.96	0.9602	0.0002	0.0131
B-C :	131	0.64	0.641	0.001	0.0099

s.d.(AB) S(between runs): 0.010 Sw(within run): 0.008 S/Sw: 1.2

s.d.(BC) S(between runs): 0.008 Sw(within run): 0.007 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

2.32	-	2.48	for	A+B
0.74	-	0.86	for	A-B
0.92	-	1.00	for	B+C
0.61	-	0.67	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	131	1.40	1.396	0.0317
R2 :	131	0.84	0.836	0.0197
R3 :	131	0.28	0.276	0.0199

DUPLICATES:

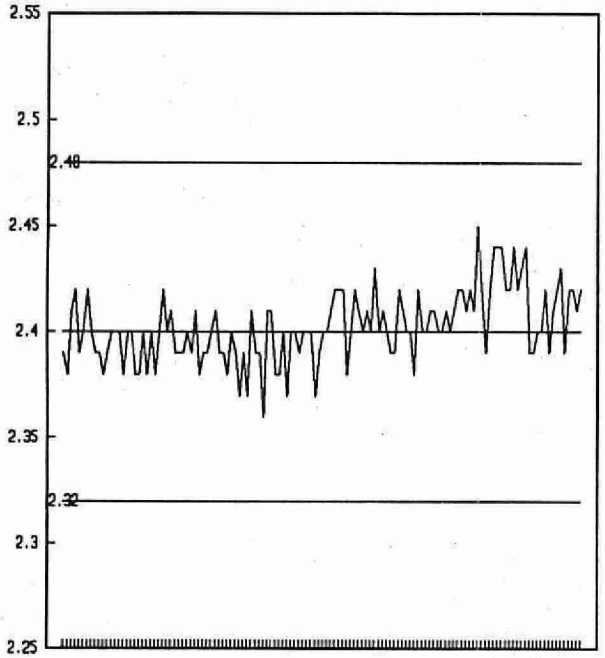
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
194	0.00	-	0.40	0.0180	23.0
153	0.40	-	1.00	0.0290	10.0
35	1.00	-	2.00	0.0484	4.9
382	Overall			0.0259	

OTHER CHECKS:

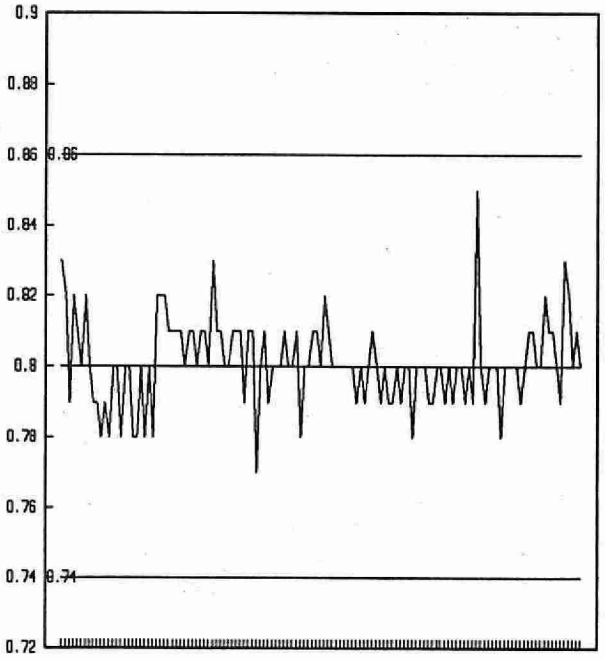
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	131	-0.002	0.005
Digested Blank	131	0.005	0.009

NITROGEN, TOTAL KJELDAHL (mg/L as N)

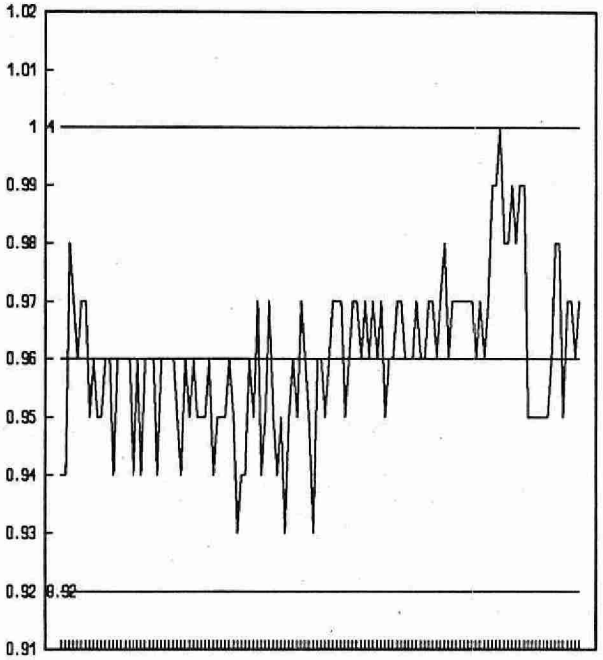
QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92



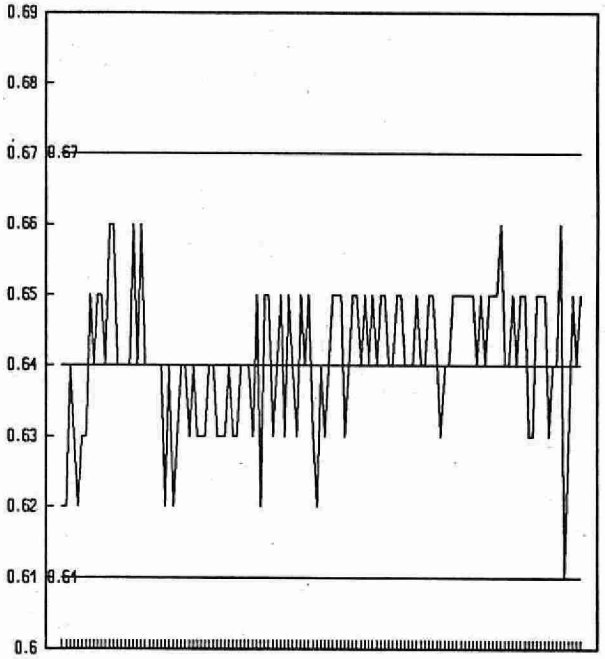
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** NITROGEN, TOTAL KJELDAHL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: NNTKUR	Units	: mg/L as N
Work Station Code	: STKNP	Unit Code	: 064807
Method Code	: 004BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3199A		
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Effluents, Leachates		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°Cand 360°C. The pH of the digestate is adjusted in-line in two stages and then ammonia is determined by formation of indophenol blue in a buffered system using nitroprusside as a catalyst.

Approximate absorbance: 1.1 at the full scale level.

Total phosphorus is determined simultaneously.

INSTRUMENTATION:

Three block digesters

Basic automated modular continuous flow system plus 1 module: 38°C bath (7.7 mL delay).

Coulourimetric measurement is through a 1.5 cm. light path at 630 nm. Data capture, reduction and processing via a multi - stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration	: LTBL plus 3 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

NOTES:

**System is calibrated with undigested standards.

Quality Control limits were changed in July 1992. Qc data prior to this date were under the control of former limits.

NITROGEN, TOTAL KJELDAHL

QUALITY CONTROL DATA FROM 13/01/92 TO 30/12/92

Lab: Colourimetry Analytical Range: - to 50.0 mg/L as N

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	156	40.0	39.968	-0.032	0.145
B :	156	20.0	19.974	-0.026	0.098
A+B :	156	60.0	59.942	-0.058	0.200
A-B :	156	20.0	19.995	-0.005	0.147
C :	156	4.0	3.975	-0.025	0.040
B+C :	156	24.0	23.948	-0.052	0.121
B-C :	156	16.0	15.999	-0.001	0.090

s.d.(AB) S(between runs): 0.12 Sw(within run): 0.10 S/Sw: 1.19

s.d.(BC) S(between runs): 0.07 Sw(within run): 0.06 S/Sw: 1.18

On any given day the calibration is accepted if the values obtained lie within the ranges:

59.3	-	60.7	for	A+B
19.4	-	20.6	for	A-B
23.6	-	24.4	for	B+C
15.7	-	16.3	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	149	35.0	34.59	0.394
R2 :	149	21.0	20.73	0.595
R3 :	149	7.0	6.89	0.094

DUPLICATES:

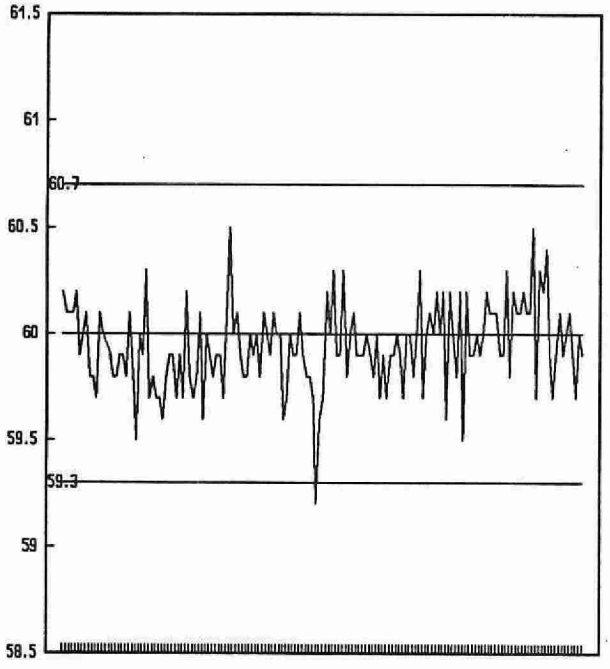
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
213	0.00	-	0.50	0.0338	18.8
148	0.50	-	2.00	0.0688	8.7
62	2.00	-	10.00	0.1738	4.0
44	10.00	-	50.00	0.2605	1.8
467	Overall			0.0702	

OTHER CHECKS:

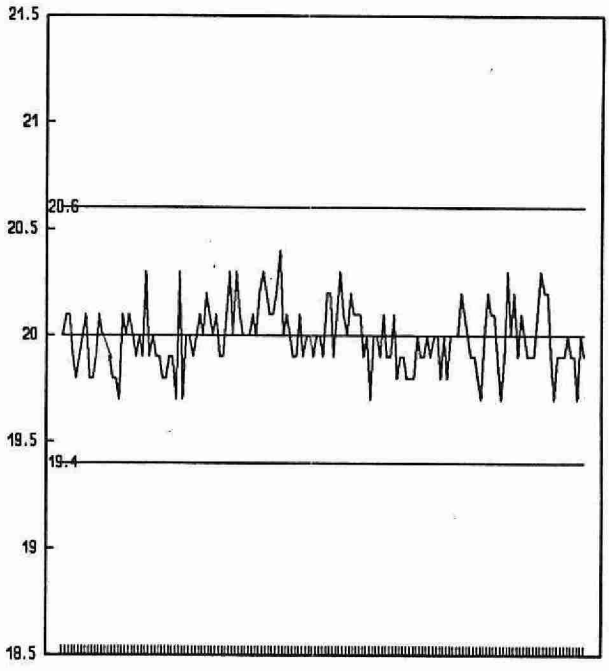
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	156	-0.005	0.021
Digested Blank	156	-0.003	0.031

NITROGEN, TOTAL KJELDAHL (mg/L as N)

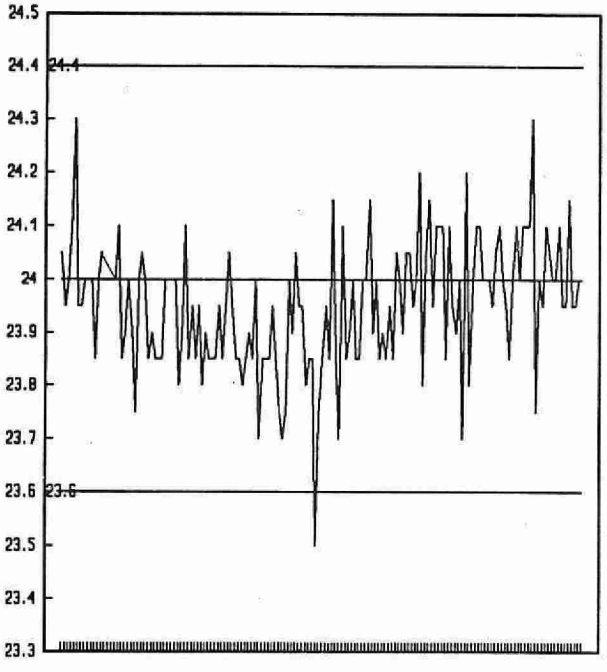
QUALITY CONTROL DATA FROM 03/01/92 TO 30/12/92



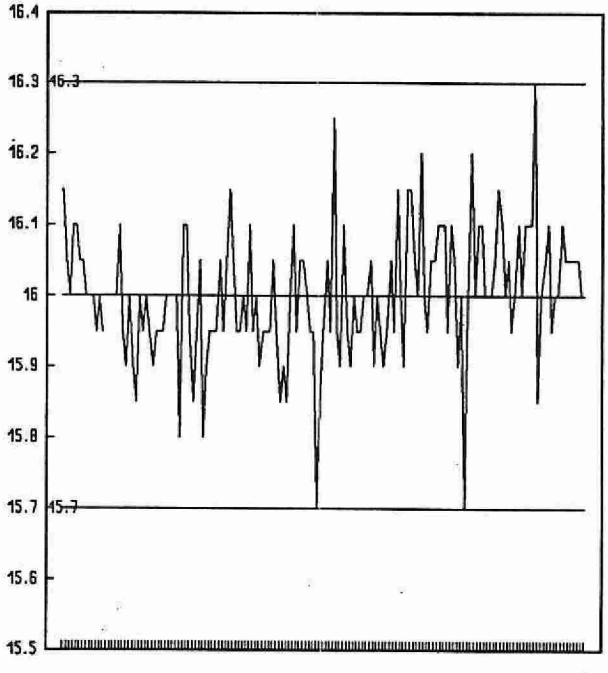
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** OXYGEN DEMAND, BIOCHEMICAL ***

IDENTIFICATION:

Laboratory	: BOD	Method Introduced	: Before '61
LIS Test Name Code	: BOD5	Units	: mg/L as O
Work Station Code	: SBBOD5	Unit Code	: 064808
Method Code	: 001AI2	Supervisor	: F. Lo
Method Reference No.	: E3182A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required	: 400 mL
Container	: Glass or plastic

SAMPLE PREPARATION:

If necessary sample pH is adjusted to neutral and chlorine is removed by reaction with sodium sulphite.

ANALYTICAL PROCEDURE:

Oxygen depletion is measured as the difference in dissolved oxygen (DO) concentration. DO readings are taken prior to sample storage, and also at the end of storage in the dark at 20°C for five days (BOD5). If necessary, dilutions are made with aerated, nutrient-enriched water to obtain a 25-75% oxygen depletion. If the sample has undergone any of the sample preparation steps listed above or if the sample is an industrial waste, a sewage seed is added. For such samples, calculation of an appropriate seed correction is required.

INSTRUMENTATION:

-Weston and Stack Oxygen analyzer with DO probe equipped with stirrer and fitted with a Teflon membrane of 0.5 mil thickness which is permeable to oxygen (1 mil=0.001 inch).
-Titration equipment for Winkler analysis of dissolved oxygen.
-Incubator (19-21°C); BOD bottles (300 mL)

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION (DO):

Blank is a sulphite solution (negligible DO) and the standard is air-saturated distilled, deionized water. The DO content of the latter is read from a table after measuring its temperature and the barometric pressure in the laboratory.

CONTROLS:

Calibration (DO) : 2 QC solutions of distilled water which have been partially stripped of DO by flushing with nitrogen. These "solutions", of different but unknown DO, are analyzed with the Oxygen Analyzer and by the Winkler titration procedure. The difference between the values for the two analytical methods is utilized as a slope control for the DO Analyzer.

*** OXYGEN DEMAND, BIOCHEMICAL cont'd ***

CONTROLS cont'd

Recovery (BOD5)*	: 3 Recovery standards prepared from a combination of Glucose and Glutamic Acid e.g. R1; the expected BOD5 is 67% of the oxygen requirement for complete oxidation.
Drift	: Air saturated distilled water after every 24 samples.
Blanks*	: Distilled deionized water and BOD dilution water

NOTES:

Tests in 1992 on sewage were performed by a private laboratory. QC results reported here represent only tests performed at the Central Laboratory.

* These solutions are incubated for five days alongside samples.

Quality Control limits were exceeded when sodium thiosulphate reagent used for Winkler Titration had expired. The reagent was replaced.

OXYGEN DEMAND, BIOCHEMICAL

QUALITY CONTROL DATA FROM 02/01/92 TO 24/12/92

Lab: BOD Analytical Range: - to 400.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	96	0.00	0.03	0.03	0.08
B :	96	0.00	0.02	0.02	0.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

-0.25 - 0.25

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	48	2.20	2.18	0.10
R2 :	51	4.34	4.17	0.62
R3 :	50	6.52	6.44	0.21

DUPLICATES:

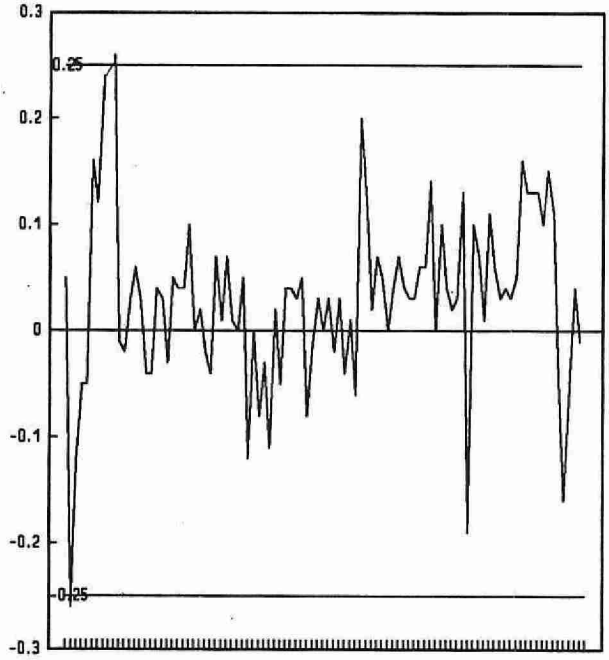
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
58	0	-	5	0.19	9.3
34	5	-	20	0.41	4.3
16	20	-	200	2.46	5.4
15	200	-	400	4.62	2.3
123	Overall			0.60	

OTHER CHECKS:

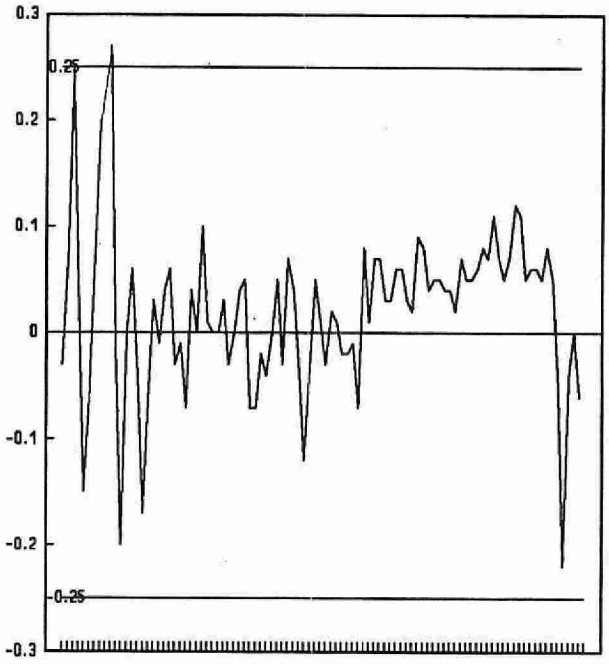
	Number of Data	Data Mean	Standard(1) Deviation
5 Day DDW Blank	50	0.16	0.08
5 Day BOD Blank	50	0.11	0.09

OXYGEN DEMAND, BIOCHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 02/01/92 TO 24/12/92



QUALITY CONTROL STANDARD A



QUALITY CONTROL STANDARD B

CONTROL LIMIT

*** OXYGEN DEMAND, CHEMICAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: RCOD	Unit Code	: 064808
Method Code	: 5251C2	Supervisor	: M. Rawlings
Method Reference No.	: E3170A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 149°C. Analysis is completed by automated colourimetric measurement of trivalent chromium. Approximate absorbance: 0.05 at the full scale level.

INSTRUMENTATION:

-Culture tubes with Teflon closures; mechanical-convection oven

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1 T value: 5

CALIBRATION:

3 digested BL plus 3 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (40 mg/L as O) spiked with 50 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND, CHEMICAL

QUALITY CONTROL DATA FROM 03/01/92 TO 21/12/92

Lab: Colourimetry Analytical Range: - to 40.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	71	40.0	40.279	0.279	1.013
B :	71	10.0	10.207	0.207	1.021
A+B :	71	50.0	50.486	0.486	1.429
A-B :	71	30.0	30.071	0.071	1.448

s.d.(AB) S(between runs): 1.02 Sw(within run): 1.02 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

46.3	-	53.7	for	A+B
27.2	-	32.8	for	A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	71	39.0	35.14	4.7
R2 :	71	9.8	9.88	3.1

DUPLICATES:

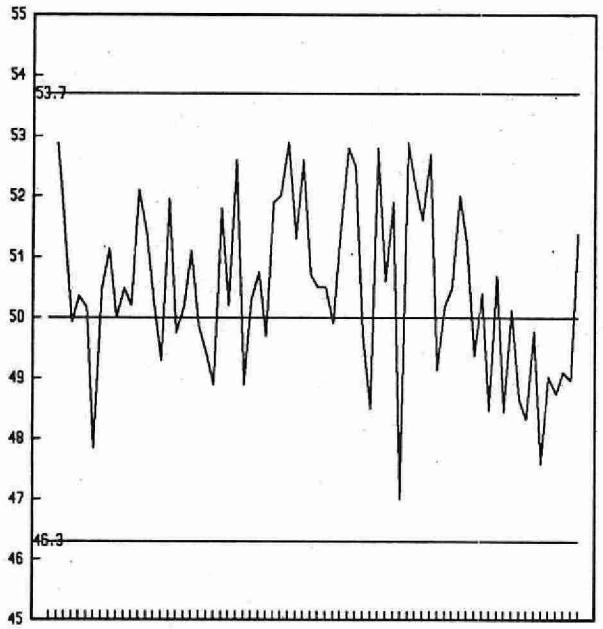
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
37	0.0	-	10.0	1.38	22.91
103	10.0	-	25.0	1.59	10.0
19	25.0	-	40.0	2.35	6.0
159		Overall		1.66	

OTHER CHECKS:

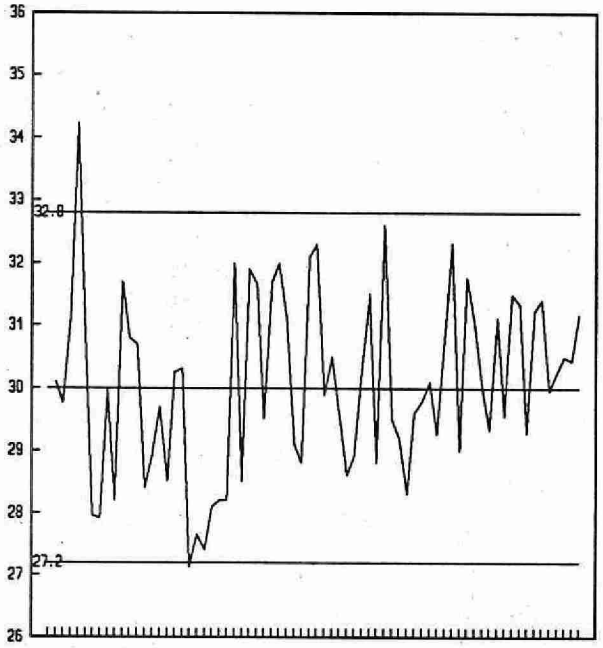
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	40	40.78	2.42

OXYGEN DEMAND, CHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 03/01/92 TO 21/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

———— CONTROL LIMIT

*** OXYGEN DEMAND, CHEMICAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/07/82
LIS Test Name Code	: COD	Units	: mg/L as O
Work Station Code	: SBCOD	Unit Code	: 064808
Method Code	: 002AC0	Supervisor	: M. Rawlings
Method Reference No.	: E3246A		
Sample Type/Matrix	: Sewage, Industrial Waste, Domestic Waters, Leachates, Effluents		

SAMPLING:

Quantity Required	: 25 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples (10.0 mL) are mixed with an acidified potassium dichromate solution which contains mercuric sulphate to suppress chloride interference. After adding concentrated sulphuric acid containing silver sulphate as a catalyst, the mixture is digested in a mechanical-convection oven for 3 hours at 149^{0}C. Analysis is completed by automated colourimetric measurement of trivalent chromium.
Approximate absorbance: 0.6 at the full scale level.

INSTRUMENTATION:

-Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 600 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

2 digested BL plus 4 digested standards

CONTROLS:

Calibration	: 2 digested standards, e.g. QCA
Recovery	: 2 digested standards, e.g. R1
Drift	: Undigested BL every 10 samples; standard plus BL at end of run
Interference	: Digested standard (50 mg/L as O) spiked to 900 mg/L Cl confirms suppression of chloride interference.

NOTES:

In order to retard sample decomposition the first reagent (acidified dichromate) is added as soon as possible at the laboratory. Analysis is scheduled for completion within the week. The recovery standard is a material known to be very difficult to digest. The expected recovery is approximately 85%, based on long term experience. We continue to use this material in spite of the poor recovery, because if the slightest problem exists with the digestion step, the recovery falls off sharply to approximately 10%.

OXYGEN DEMAND, CHEMICAL

QUALITY CONTROL DATA FROM 15/01/92 TO 21/12/92

Lab: Colourimetry Analytical Range: - to 500.0 mg/L as O

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	59	400	396.88	3.12	5.75
B :	59	100	101.67	1.67	7.89
A+B :	59	500	498.55	1.45	11.83
A-B :	59	300	295.21	4.79	7.09

s.d.(AB) S(between runs): 6.9 Sw(within run): 5.0 S/Sw: 1.48

On any given day the calibration is accepted if the values obtained lie within the ranges:

477.5	-	522.5	for	A+B
285.0	-	315.0	for	A-B

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	59	390	375.99	15.3
R2 :	59	98	100.48	13.9

DUPLICATES:

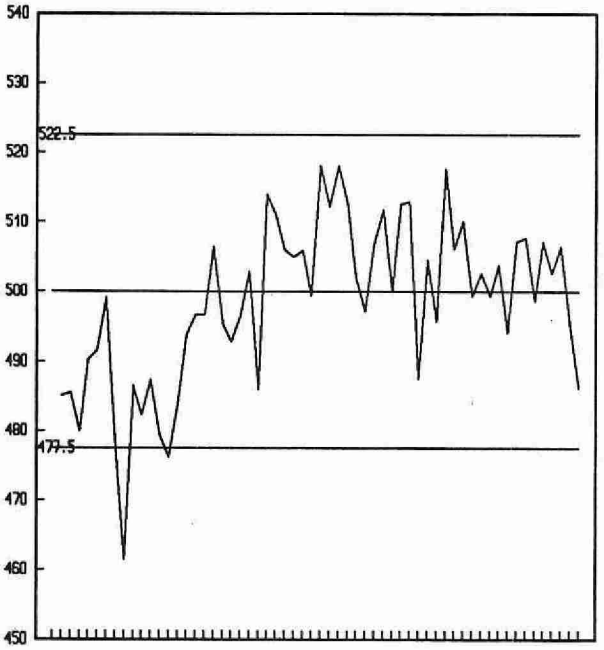
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
54	0	-	100	2.27	17.07
51	100	-	250	4.08	7.7
24	250	-	500	10.78	9.0
129	Overall			3.90	

OTHER CHECKS:

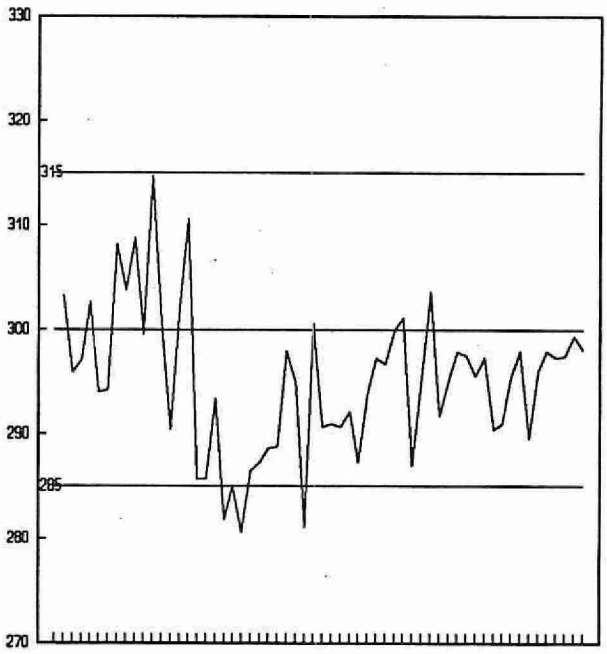
	Number of Data	Data Mean	Standard(1) Deviation
Chloride Check	59	63.5	9.56

OXYGEN DEMAND, CHEMICAL (mg/L as O)

QUALITY CONTROL DATA FROM 15/01/92 TO 21/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOCOP	Unit Code	: nil
Method Code	: 0903PH	Supervisor	: J. McBride
Method Reference No.	: E3027A		
Sample Type/Matrix	: Lakes		

SAMPLING:

Quantity Required : 100 mL
Container : BOD bottle filled to the brim; screw caps with cone-shaped liners.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (50 mL) at room temperature by a pH meter. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration : BL plus 2 standards, e.g. QCA, QCB
Drift : 2 standard buffers - 2 times daily

pH

QUALITY CONTROL DATA FROM 21/01/92 TO 16/11/92

Lab: Dorset Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	35	6.86	6.843	-0.017	0.020
B :	35	4.00	4.014	0.014	0.017
A+B :	35	10.86	10.857	0.003	0.031
A-B :	35	2.86	2.829	-0.031	0.022

s.d.(AB) S(between runs): 0.019 Sw(within run): 0.016 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

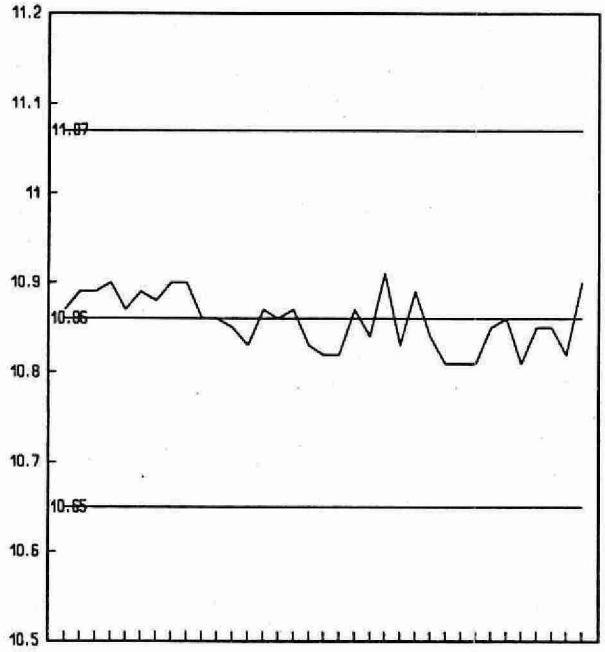
10.65	-	11.07	for	A+B
2.72	-	3.00	for	A-B

DUPLICATES:

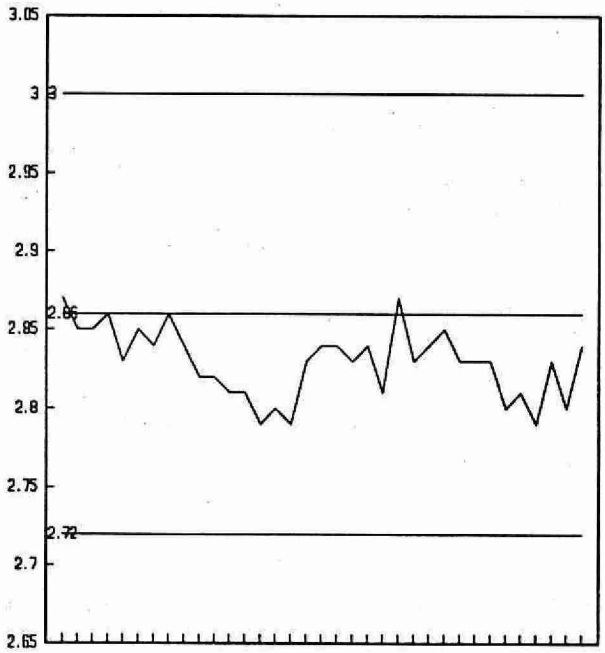
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
29	4.50	-	5.50	0.027	0.5
40	5.50	-	6.00	0.063	1.4
25	6.00	-	7.00	0.067	1.2
0	7.0	-	14.00	N.A.	N.A.
94	Overall			0.051	

pH

QUALITY CONTROL DATA FROM 21/01/92 TO 16/11/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 01/01/76
LIS Test Name Code	: pH	Units	: dimensionless
Work Station Code	: DOT	Unit Code	: nil
Method Code	: 0902PH	Supervisor	: J. McBride
Method Reference No.	: E3027A		
Sample Type/Matrix	: Streams, Lakes, Precipitation, and Groundwater		

SAMPLING:

Quantity Required	: 150 mL
Container	: 250 mL Amber polyethylene or BOD bottle filled to the brim; screw caps with cone-shaped liners are preferred.

ANALYTICAL PROCEDURE:

pH is measured directly on a stirred sample (100 mL) at room temperature. Stirring rate, beaker size, degree of electrode immersion and room temperature range are uniform for all samples and standards. Alkalinity (Gran) is performed simultaneously.

INSTRUMENTATION:

Digital pH meter, stirrer, combined glass electrode.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 7.

CONTROLS:

Calibration	: BL plus 2 standards, e.g. QCA, QCB
Drift	: 2 standard buffers - 2 times daily

pH

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	202	6.86	6.862	0.002	0.014
B :	202	4.00	4.024	0.024	0.016
A+B :	202	10.86	10.886	0.026	0.023
A-B :	202	2.86	2.837	-0.023	0.023

s.d.(AB) S(between runs): 0.015 Sw(within run): 0.013 S/Sw: 1.11

On any given day the calibration is accepted if the values obtained lie within the ranges:

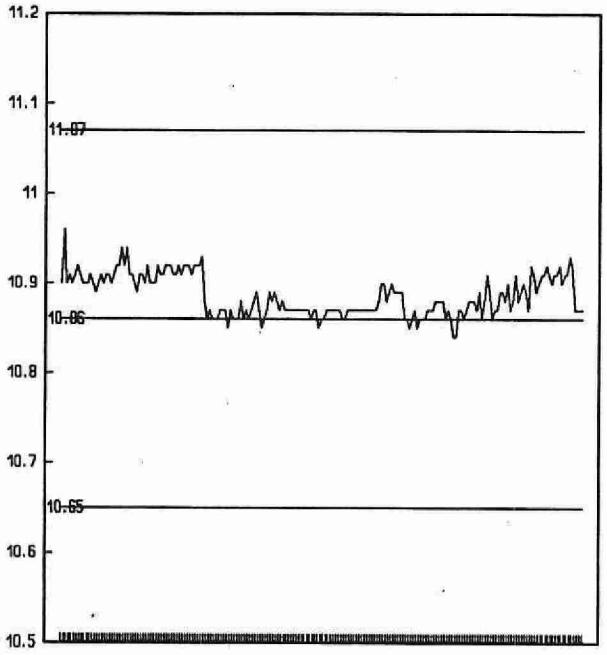
10.65	-	11.07	for	A+B
2.72	-	3.00	for	A-B

DUPLICATES:

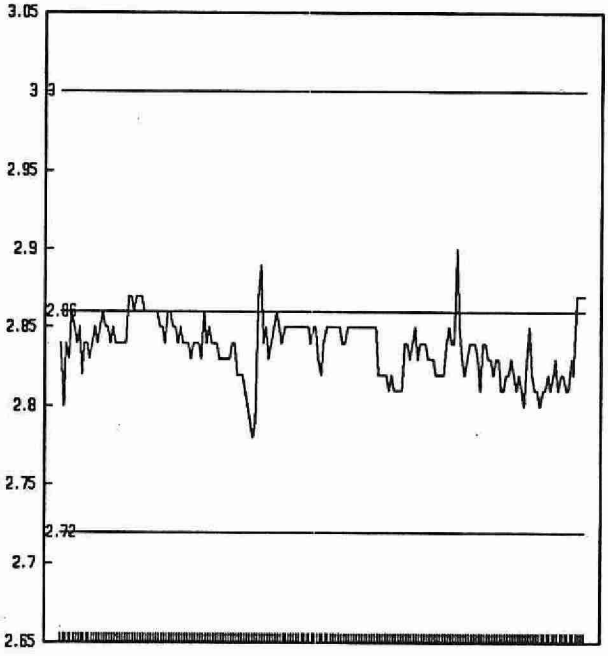
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
133	3.5	-	5.0	0.011	0.4
233	5.0	-	6.0	0.028	1.1
101	6.0	-	7.0	0.031	0.6
467	Overall			0.025	
618				0.028	

pH

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 01/05/79
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: PHACD	Unit Code	: nil
Method Code	: 002AI1	Supervisor	: F. Lo
Method Reference No.	: E3248A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Plastic or glass

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint acidity and Gran acidity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA

pH

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92

Lab: Titration Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	40	4.45	4.451	0.001	0.0079
B :	40	3.75	3.749	-0.001	0.0106
A+B :	40	8.20	8.200	0.000	0.0139
A-B :	40	0.70	0.702	0.002	0.0125

s.d.(AB) S(between runs): 0.009 Sw(within run): 0.009 S/Sw:1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

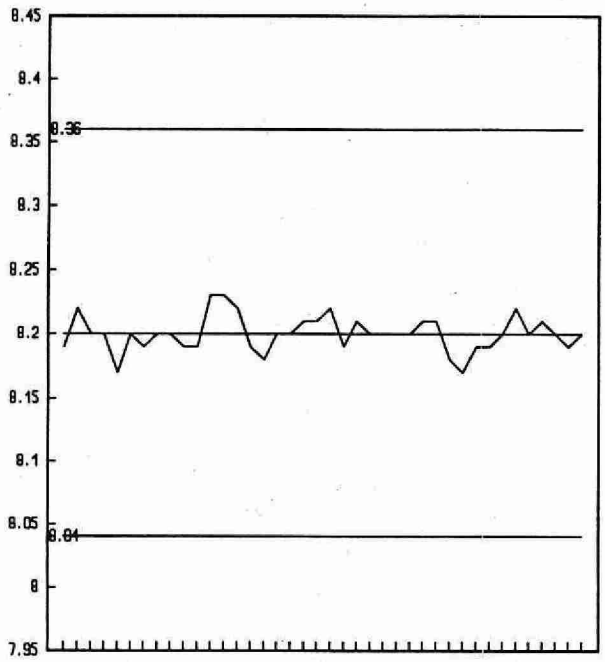
8.04	-	8.36	for	A+B
0.59	-	0.81	for	A-B

DUPLICATES:

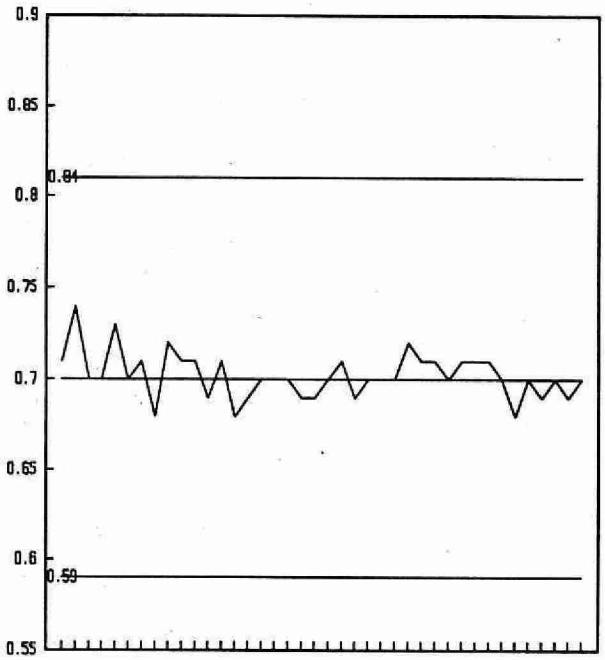
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
50	4.0	-	4.5	0.0149	0.4
25	4.5	-	5.0	0.0191	0.4
11	5.0	-	7.0	0.0518	0.9
0	7.0	-	14.0	N.A	N.A.
86	Overall			0.0241	

pH

QUALITY CONTROL DATA FROM 10/01/92 TO 17/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: RATS	Unit Code	: nil
Method Code	: 003AI2	Supervisor	: F. Lo
Method Reference No.	: E3289A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards.
Gran Alkalinity, total fixed endpoint alkalinity, and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration	: 2 QC standards e.g. QCA
Drift	: In run standards throughout the run (diluted tap water 20% V/V)

pH

QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92

Lab: Titration Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	115	7.41	7.430	0.020	0.0264
B :	115	4.45	4.479	0.029	0.0432
A+B :	115	11.86	11.909	0.049	0.0569
A-B :	115	2.96	2.950	-0.010	0.0435

s.d.(AB) S(between runs): 0.036 Sw(within run): 0.031 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

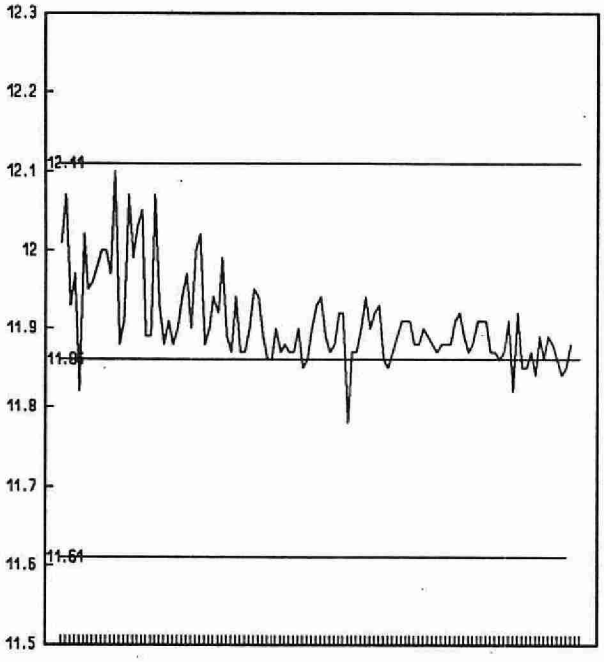
11.61	-	12.11	for A+B
2.79	-	3.13	for A-B

DUPLICATES:

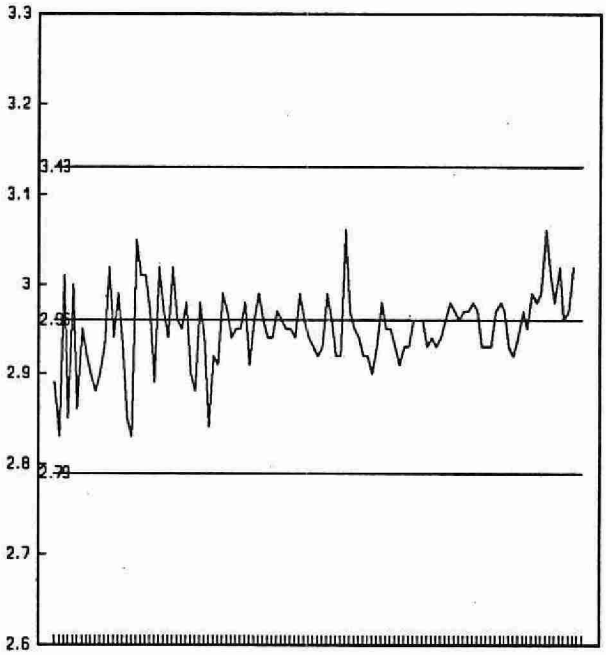
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
20	3.50 - 7.00	0.0750	1.5
99	7.00 - 8.00	0.0967	1.1
171	8.00 - 9.50	0.0746	0.9
290	Overall	0.0825	

pH

QUALITY CONTROL DATA FROM 09/01/92 TO 29/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: 09/07/80
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WATS	Unit Code	: nil
Method Code	: 003A12	Supervisor	: F. Lo
Method Reference No.	: E3218A		
Sample Type/Matrix	: Domestic Waters, Sewage, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (10.0 mL) at room temperature. Stirring rate, tube size, degree of electrode immersion, and room temperature range are uniform for all samples and standards. Total fixed endpoint alkalinity and conductivity are determined simultaneously.

INSTRUMENTATION:

Automated modular titration system with microcomputer control and data processing software.

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range 4 to 9

CONTROLS:

Calibration	: 2 standards e.g. QCA
Drift	: In run standards throughout the run (tap water diluted to 50% V/V)v

pH

QUALITY CONTROL DATA FROM 03/01/92 TO 31/12/92

Lab: Titration Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	161	7.44	7.437	-0.003	0.0245
B :	161	4.50	4.450	0.000	0.0450
A+B :	161	11.94	11.937	-0.003	0.0514
A-B :	161	2.94	2.937	-0.003	0.0511

s.d.(AB) S(between runs): 0.036 Sw(within run): 0.036 S/Sw: 1.00

On any given day the calibration is accepted if the values obtained lie within the ranges:

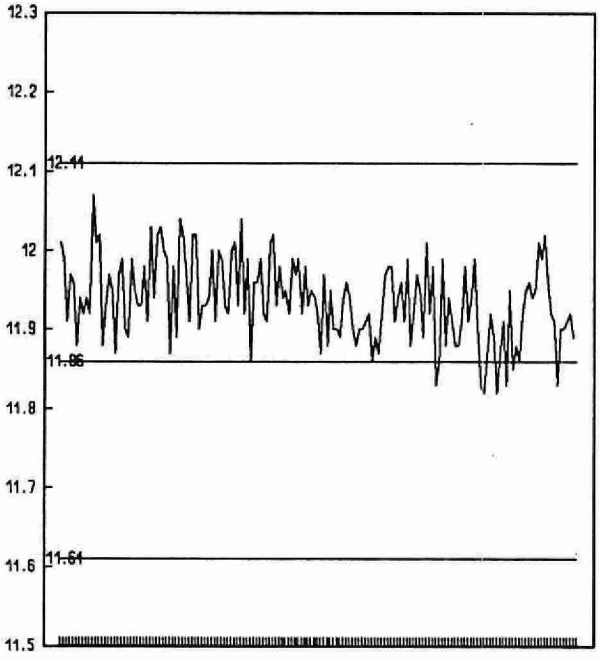
11.61	-	12.11	for	A+B
2.79	-	3.13	for	A-B

DUPLICATES:

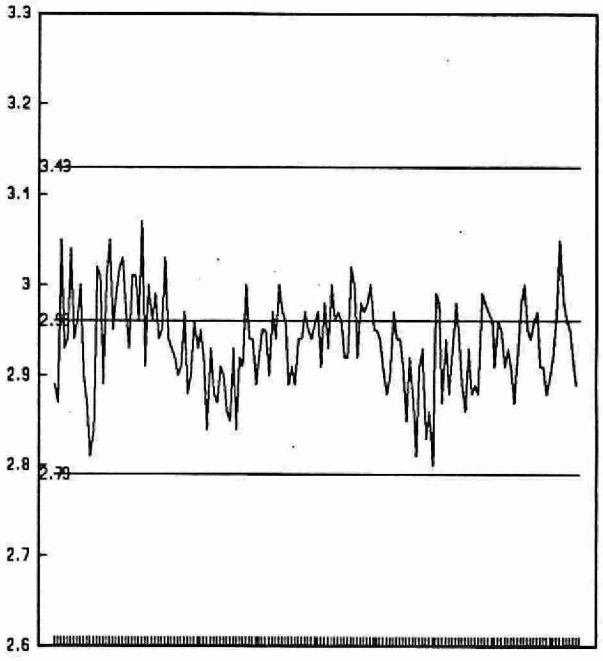
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
27	2.00 - 7.00	0.1816	3.1
200	7.00 - 8.00	0.1883	2.4
192	8.00 - 10.00	0.1171	1.5
419	Overall	0.1573	

pH

QUALITY CONTROL DATA FROM 03/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** pH ***

IDENTIFICATION:

Laboratory	: Titration	Method Introduced	: Before '70
LIS Test Name Code	: PH	Units	: Dimensionless
Work Station Code	: WQSDIRT	Unit Code	: nil
Method Code	: 004AI4	Supervisor	: F. Lo
Method Reference No.	: E3228A		
Sample Type/Matrix	: Landfill leachates		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

pH is directly measured on a stirred sample (15 mL) at room temperature. Stirring rate and room temperature range are uniform for all samples and standards.

INSTRUMENTATION:

pH meter, stirrer, Radiometer combination electrode

REPORTING:

Maximum Significant Figures: 3

CALIBRATION:

2 standard buffers covering the pH range of 4 to 9

CONTROLS:

Calibration	: 2 standards e.g. QCA

pH

QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92

Lab: Titration Analytical Range: - to 14.00 Dimensionless

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	26	7.41	7.420	0.010	0.0153
B :	26	4.45	4.462	0.012	0.0465
A+B :	26	11.86	11.881	0.021	0.0483
A-B :	26	2.96	2.958	-0.002	0.0496

s.d.(AB) S(between runs): 0.0346 Sw(within run): 0.0351 S/Sw: 0.99

On any given day the calibration is accepted if the values obtained lie within the ranges:

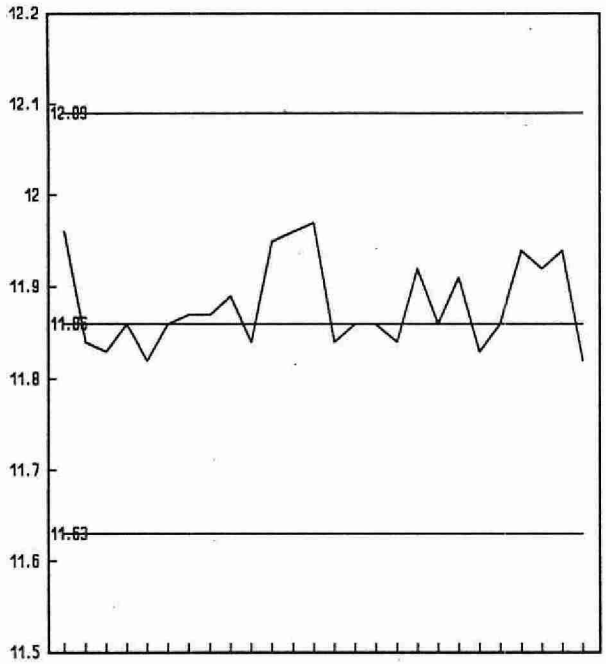
11.63	-	12.09	for	A+B
2.81	-	3.11	for	A-B

DUPLICATES:

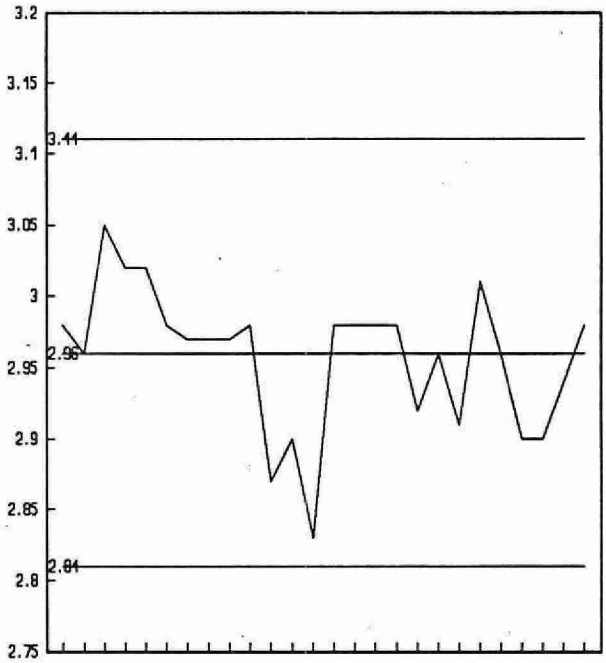
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
14	4.0	-	7.00	0.0314	0.4
36	7.00	-	8.00	0.0387	0.6
20	8.00	-	9.00	0.0159	0.2
70	Overall			0.0294	

pH

QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** PHENOLICS, REACTIVE ***

IDENTIFICATION:

Laboratory	: MISA	Method Introduced	: 01/03/89
LIS Test Name Code	: PHNOL	Units	: µg/L as Phenol
Work Station Code	: MPHEN	Unit Code	: 063704
Method Code	: 002BC3	Supervisor	: J. McBride
Method Reference No.	: E3290A		
Sample Type/Matrix	: Sewage, Industrial Wastes, Leachates		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass

ANALYTICAL PROCEDURE:

Samples are screened for oxidizing and reducing potential and neutralized, if required, and pH adjusted to 4 +/- 0.3 before manual distillation. Reactive phenolics are determined on the distillate colourimetrically, by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide. Approximate absorbance: 0.022 at full scale

INSTRUMENTATION:

Basic automated modular continuous flow system. Colourimetric measurement is through a 5.0 cm light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

Blank plus 4 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: Bl, standard, Bl every 10 samples
Recovery	: Spiked blank and spiked sample every 10 samples
Blank	: Manual distillation blank checked before using every apparatus
Matrix	: Distillate from every sample is analyzed at 50% further dilution

NOTES:

The MPHEN work station was set up specifically for the difficult and variable matrices in MISA effluents.

MODIFICATIONS:

Minor modifications have been made to the procedure since starting in 1989: e.g. glassware washing and proofing improved, rinse waterline changed from plastic to glass where possible, concentration of calibration solutions was modified to cover analytical range better, and the in-line heater was removed.

PHENOLICS, REACTIVE

QUALITY CONTROL DATA FROM 08/01/92 TO 31/12/92

Lab: Colourimetry Analytical Range: - to 50.0 µg/L as Phenol

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	82	40	39.75	-0.25	0.648
B :	82	10	9.92	-0.08	0.252
A+B :	82	50	49.67	-0.33	0.799
A-B :	82	30	29.83	-0.17	0.585

s.d.(AB) S(between runs): 0.49 Sw(within run): 0.41 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

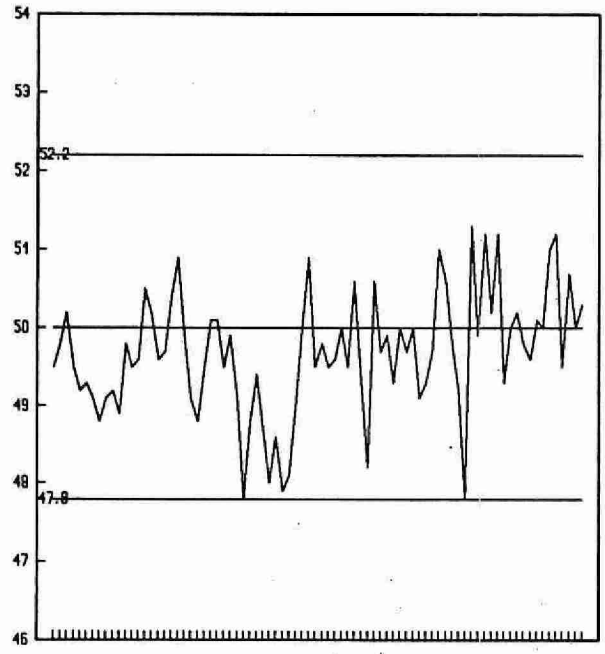
47.8	-	52.2	for	A+B
28.5	-	31.5	for	A-B

DUPLICATES:

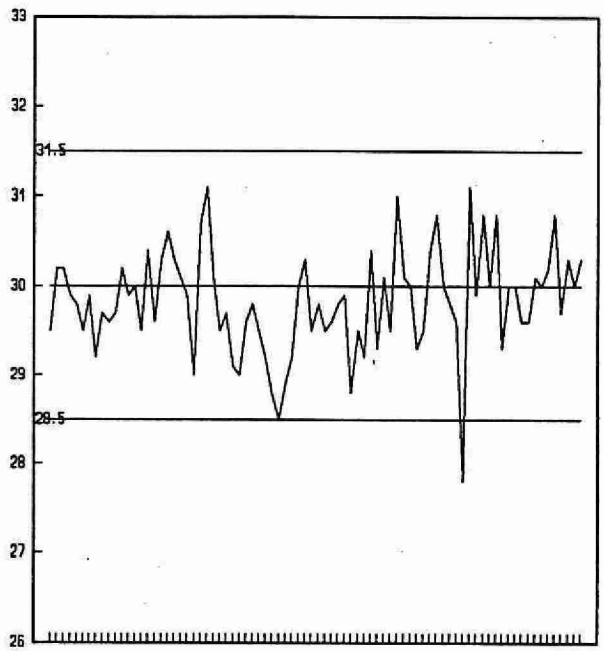
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
125	0.0	-	0.20	0.156	67.5
75	0.20	-	2.00	0.234	34.3
13	2.00	-	10.00	0.536	13.2
10	10.00	-	50.00	1.985	20.3
223	Overall			0.733	

PHENOLICS, REACTIVE (µg/L as Phenol)

QUALITY CONTROL DATA FROM 08/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** PHENOLICS, REACTIVE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/74
LIS Test Name Code	: PHNOL	Units	: µg/L as Phenol
Work Station Code	: ROPHEN	Unit Code	: 063704
Method Code	: 002BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3179A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents, Domestic Water Supplies, Leachates, Sewage, Industrial Wastes		

SAMPLING:

Quantity Required	: 250 mL
Container	: Glass
Preservative	: Sulfuric acid to pH 1.5 - 2
Other	: Special bottle (with white cap) containing preservative is available

ANALYTICAL PROCEDURE:

Samples are automatically distilled from an acid media, and reactive phenolics in the distillate are determined colourimetrically by formation of an antipyrene dye through reactions with 4-aminoantipyrene and potassium ferricyanide.
Approximate absorbance: 0.03 at the full scale level.

INSTRUMENTATION:

Basic automated modular continuous flow system plus a distillation module. Colourimetric measurement is through a 5.0 cm. light path at 505 nm.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 2 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, standard, BL every 10 samples

NOTES:

A report identifying reactive phenolics is available on request.

PHENOLICS, REACTIVE

QUALITY CONTROL DATA FROM 10/01/92 TO 14/08/92

Lab: Colourimetry Analytical Range: - to 40.0 µg/L as Phenol

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	16	40	40.25	0.25	0.6851
B :	16	10	9.93	-0.07	0.3115
A+B :	16	50	50.19	0.19	0.8668
A-B :	16	30	30.31	0.31	0.6176

s.d.(AB) S(between runs): 0.53 Sw(within run): 0.44 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

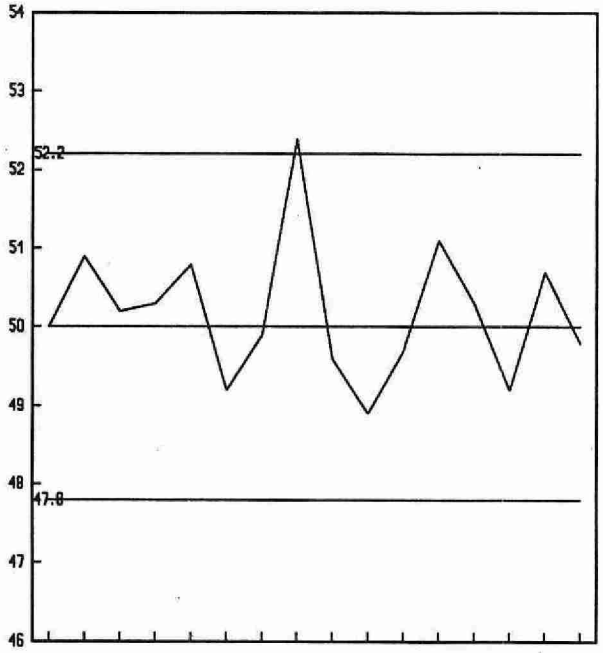
47.8	-	52.2	for	A+B
28.5	-	31.5	for	A-B

DUPLICATES:

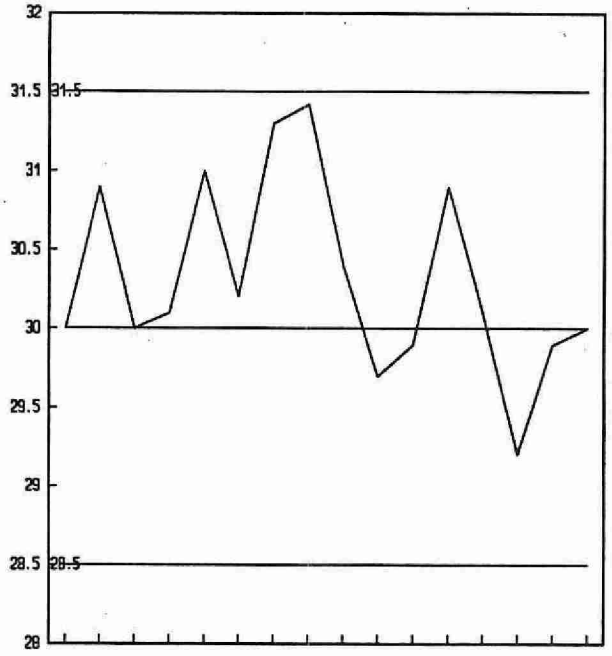
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
9	0.0	-	2.5	0.0963	5.5
7	2.5	-	20.0	0.2488	12.4
0	20.0	-	40.0	N.A.	N.A.
16	Overall			0.1506	

PHENOLICS, REACTIVE (µg/L as Phenol)

QUALITY CONTROL DATA FROM 10/01/92 TO 14/08/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

———— CONTROL LIMIT

*** PHOSPHORUS, REACTIVE ortho-PHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: RNDNP	Unit Code	: 064815
Method Code	: 103DC2	Supervisor	: M. Rawlings
Method Reference No.	: E3266A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ortho-phosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.2 at the full scale level.
Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.001 T value: 0.005

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

PHOSPHORUS, REACTIVE ortho-PHOSPHATE

QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92

Lab: Colourimetry Analytical Range: - to 0.10 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	105	0.08	0.08004	0.00004	0.00055
B :	105	0.04	0.0403	0.0003	0.00046
A+B :	105	0.12	0.1203	0.0003	0.00085
A-B :	105	0.04	0.0397	-0.0003	0.00055
C :	105	0.008	0.0083	0.0003	0.00038
B+C :	105	0.048	0.0486	0.0006	0.00071
B-C :	105	0.032	0.03202	0.00002	0.00045

s.d.(AB) S(between runs): 0.0005 Sw(within run): 0.0004 S/Sw: 1.3

s.d.(BC) S(between runs): 0.0004 Sw(within run): 0.0003 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.115	-	0.125	for	A+B
0.037	-	0.043	for	A-B
0.045	-	0.051	for	B+C
0.030	-	0.034	for	B-C

DUPLICATES:

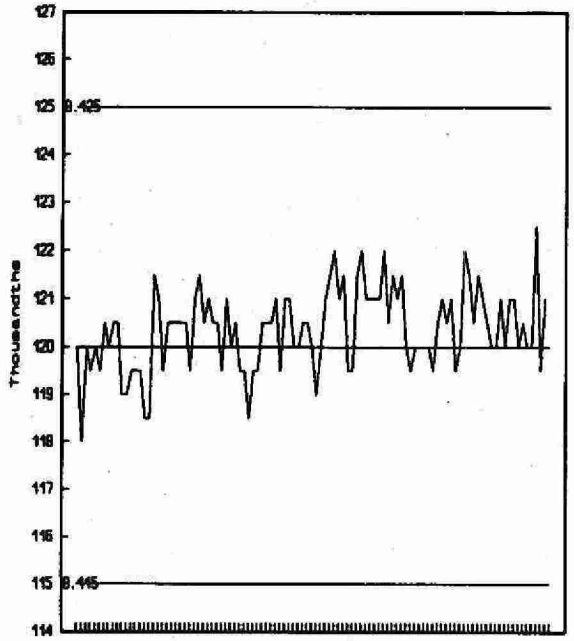
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
222	0.000	-	0.005	0.0006	46.3
44	0.005	-	0.020	0.0014	15.7
25	0.020	-	0.10	0.0022	32.7
291	Overall			0.0007	

OTHER CHECKS:

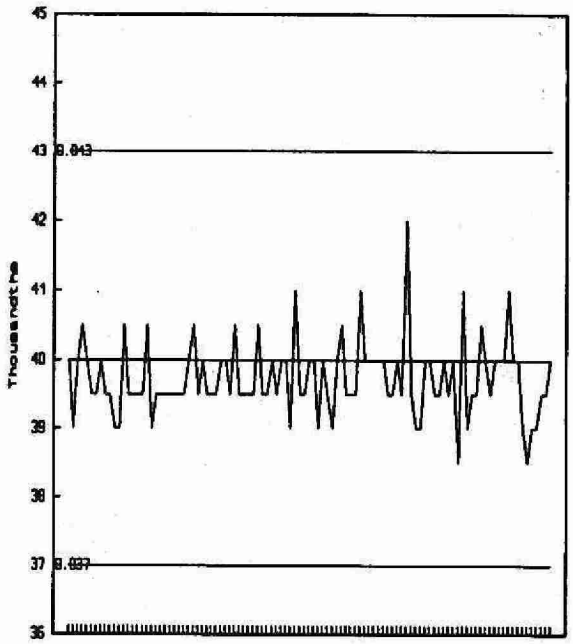
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	105	-0.00003	0.00032

PHOSPHORUS, REACTIVE ortho-PHOSPHATE (mg/L as P)

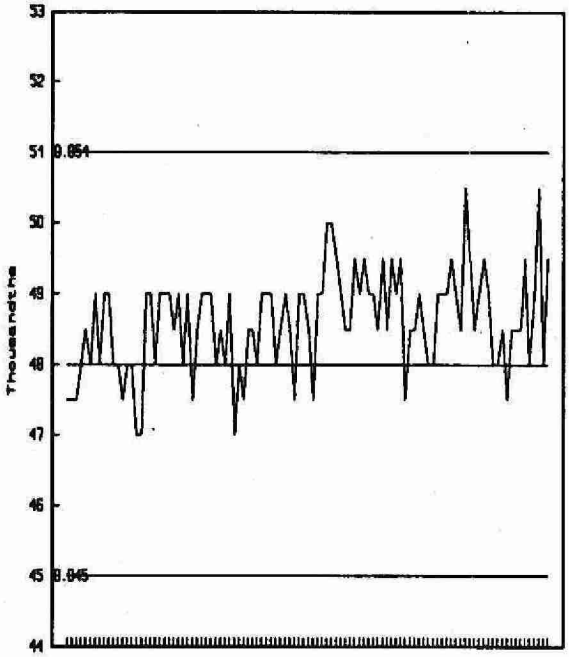
QUALITY CONTROL DATA FROM 14/01/92 TO 22/12/92



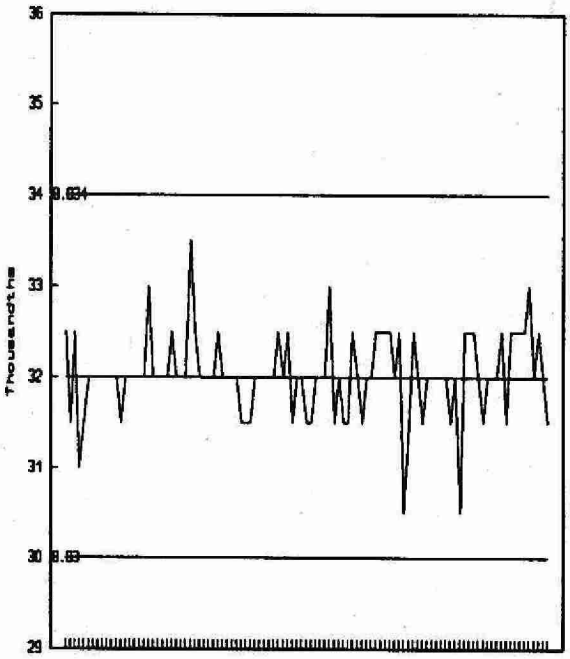
QUALITY CONTROL SAMPLE A+B



QUALITY CONTROL SAMPLE A-B



QUALITY CONTROL SAMPLE B+C



QUALITY CONTROL SAMPLE B-C

CONTROL LIMIT

*** PHOSPHORUS, REACTIVE ortho-PHOSPHATE ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPO4FR	Units	: mg/L as P
Work Station Code	: SDNP	Unit Code	: 064815
Method Code	: 103BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3185A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 10 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Ortho-phosphate is determined on the supernatant of a settled sample by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.5 at the full scale level.
Ammonia plus ammonium, nitrite, and nitrate plus nitrite are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standard every 20 samples

PHOSPHORUS, REACTIVE ortho-PHOSPHATE

QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92

Lab: Colourimetry Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	118	8.0	7.993	-0.007	0.036
B :	118	4.0	4.014	0.014	0.019
A+B :	118	12.0	12.007	0.007	0.043
A-B :	118	4.0	3.979	-0.021	0.038
C :	118	0.8	0.791	-0.009	0.014
B+C :	118	4.8	4.805	0.005	0.028
B-C :	118	3.2	3.223	0.023	0.018

s.d.(AB) S(between runs): 0.029 Sw(within run): 0.027 S/Sw: 1.07

s.d.(BC) S(between runs): 0.016 Sw(within run): 0.013 S/Sw: 1.30

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.7	-	12.3	for	A+B
3.78	-	4.22	for	A-B
4.66	-	4.94	for	B+C
3.09	-	3.31	for	B-C

DUPLICATES:

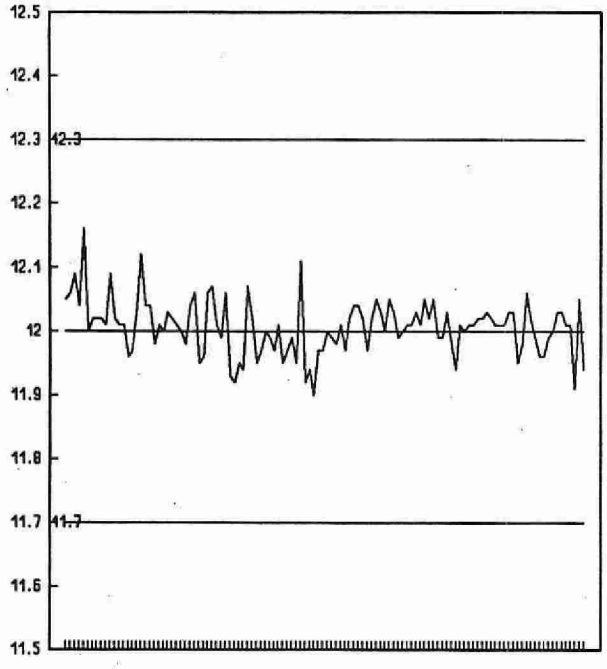
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
147	0.00	-	0.10	0.0103	51.1
65	0.10	-	1.00	0.0198	5.8
40	1.00	-	5.00	0.0489	2.7
3	5.00	-	10.00	0.0356	0.5
255	Overall			0.1710	

OTHER CHECKS:

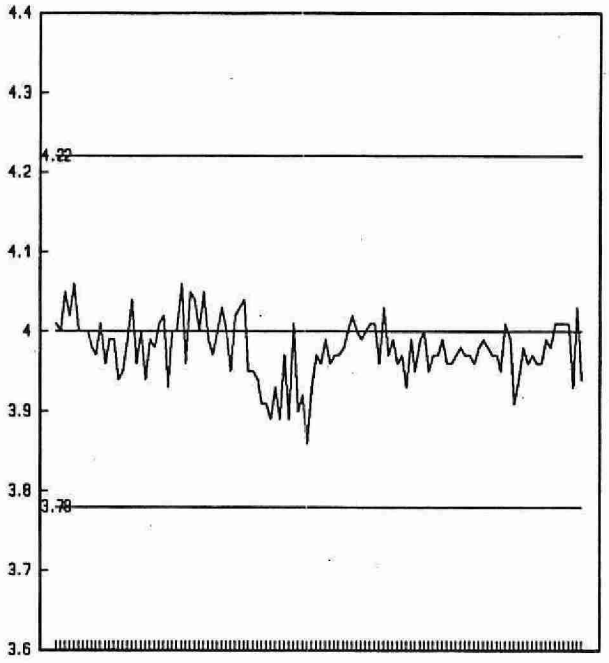
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	118	0.0002	0.007

PHOSPHORUS, REACTIVE ortho-PHOSPHATE (mg/L as P)

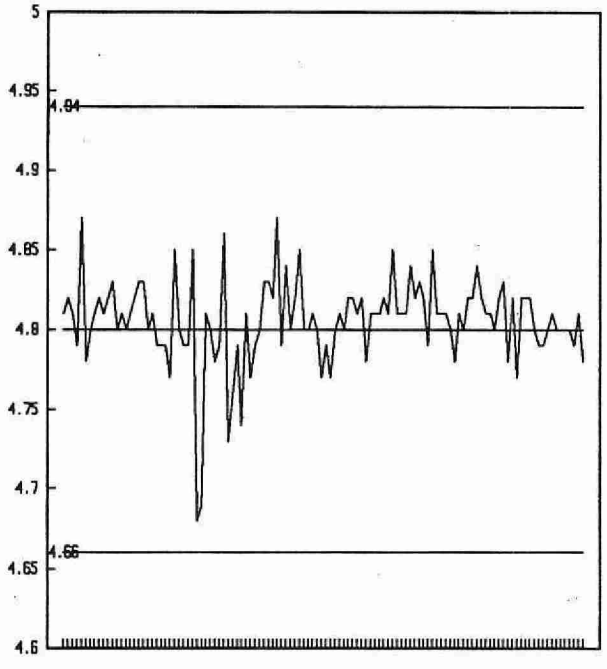
QUALITY CONTROL DATA FROM 08/01/92 TO 28/12/92



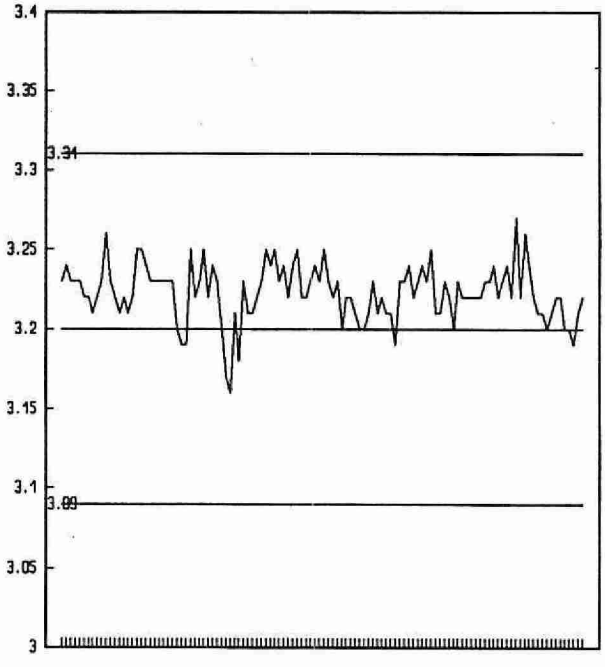
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B-C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: RTNP	Unit Code	: 064815
Method Code	: 504AC2	Supervisor	: M. Rawlings
Method Reference No.	: E3181A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digesters kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.4 at the full scale level.
Total Kjeldahl nitrogen is determined simultaneously.

INSTRUMENTATION:

Three Block digesters
Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube.
Data capture, reduction, and processing via a multi-stage microcomputer system

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.01

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 0.20 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	131	0.16	0.1602	0.0002	0.0008
B :	131	0.08	0.0799	-0.0001	0.0005
A+B :	131	0.24	0.2401	0.0001	0.0010
A-B :	131	0.08	0.0803	0.0003	0.0009
C :	131	0.016	0.0158	-0.0002	0.0005
B+C :	131	0.096	0.0957	-0.0003	0.0008
B-C :	131	0.064	0.0641	0.0001	0.0006

s.d.(AB) S(between runs): 0.0007 Sw(within run): 0.0006 S/Sw: 1.09

s.d.(BC) S(between runs): 0.0005 Sw(within run): 0.0004 S/Sw: 1.24

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.233	-	0.247	for	A+B
0.075	-	0.085	for	A-B
0.092	-	0.100	for	B+C
0.061	-	0.067	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	131	0.14	0.138	0.0032
R2 :	131	0.084	0.084	0.0034
R3 :	131	0.028	0.029	0.0028

DUPLICATES:

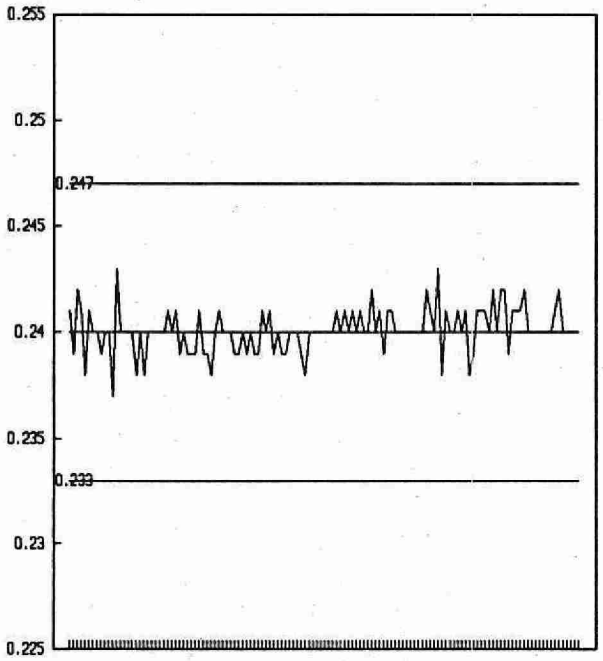
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
215	0.000	-	0.020	0.0027	50.4
91	0.020	-	0.050	0.0033	20.1
71	0.050	-	0.200	0.0040	8.7
377	Overall			0.0031	

OTHER CHECKS:

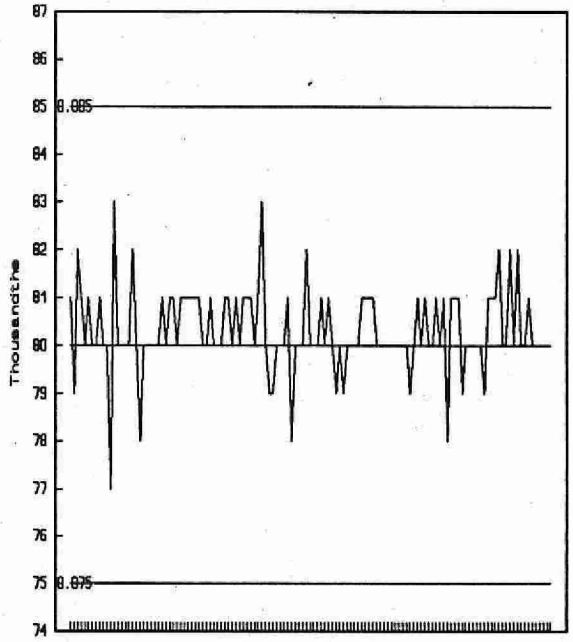
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	131	0.0002	0.0004
Digested Blank	131	0.0032	0.0014

PHOSPHORUS, TOTAL (mg/L as P)

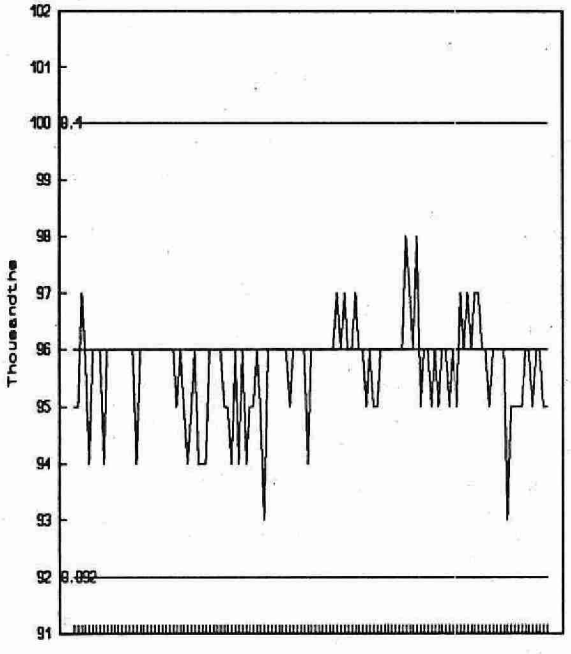
QUALITY CONTROL DATA FROM 02/01/92 TO 23/12/92



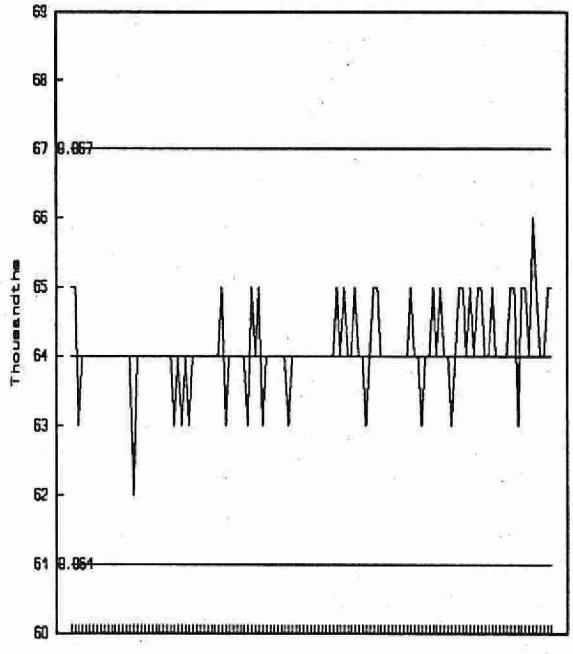
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/04/79
LIS Test Name Code	: PPUT	Units	: mg/L as P
Work Station Code	: STKNP	Unit Code	: 064815
Method Code	: 504BC2	Supervisor	: M. Rawlings
Method Reference No.	: E3200A		
Sample Type/Matrix	: Sewage, Industrial Waste, Leachate, Domestic Waters, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Samples are digested in a sulphuric acid-mercuric oxide-potassium sulphate media using three block digestors kept at 180°C, 210°C and 360°C. The pH of the digestate is adjusted in-line and then orthophosphate is determined by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.

Approximate absorbance: 0.8 at the full scale level.

Total Kjeldahl Nitrogen is determined simultaneously.

INSTRUMENTATION:

3-Block digesters

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using an IR sensitive phototube. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards in duplicate, e.g. R1
Drift	: BL every 10 samples; undigested standard every 20 samples

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 03/01/92 TO 30/12/92

Lab: Colourimetry Analytical Range: - to 10.0 mg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	157	8.0	7.996	-0.004	0.0275
B :	157	4.0	3.994	-0.006	0.0174
A+B :	157	12.0	11.990	-0.010	0.0315
A-B :	157	4.0	4.003	0.003	0.0335
C :	157	0.8	0.798	-0.002	0.0124
B+C :	157	4.8	4.792	-0.008	0.0247
B-C :	157	3.2	3.195	-0.005	0.0174

s.d.(AB) S(between runs): 0.023 Sw(within run): 0.024 S/Sw: 0.97

s.d.(BC) S(between runs): 0.015 Sw(within run): 0.012 S/Sw: 1.22

On any given day the calibration is accepted if the values obtained lie within the ranges:

11.9	-	12.1	for	A+B
3.9	-	4.1	for	A-B
4.7	-	4.9	for	B+C
3.15	-	3.25	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	157	7.0	6.85	0.086
R2 :	157	4.2	4.11	0.115
R3 :	157	1.4	1.37	0.021

DUPLICATES:

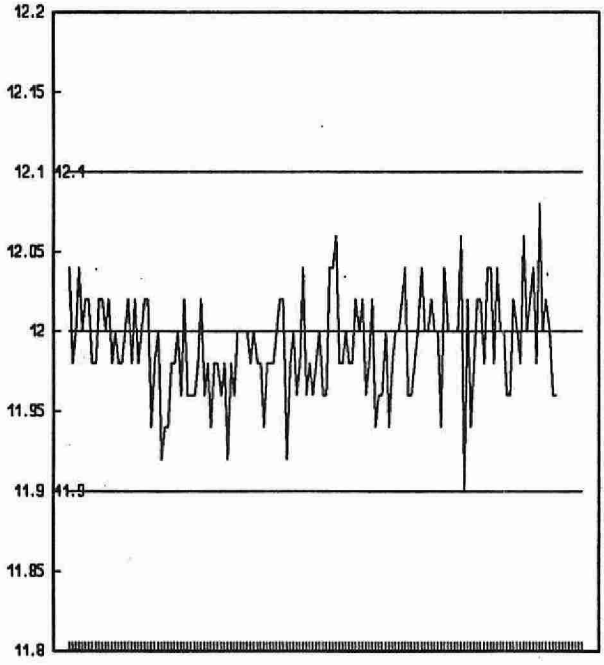
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
286	0.00	-	0.50	0.0165	41.2
37	0.50	-	1.00	0.0256	4.3
25	1.00	-	5.00	0.0517	3.1
7	5.00	-	10.00	0.0909	1.0
355	Overall			0.0189	

OTHER CHECKS:

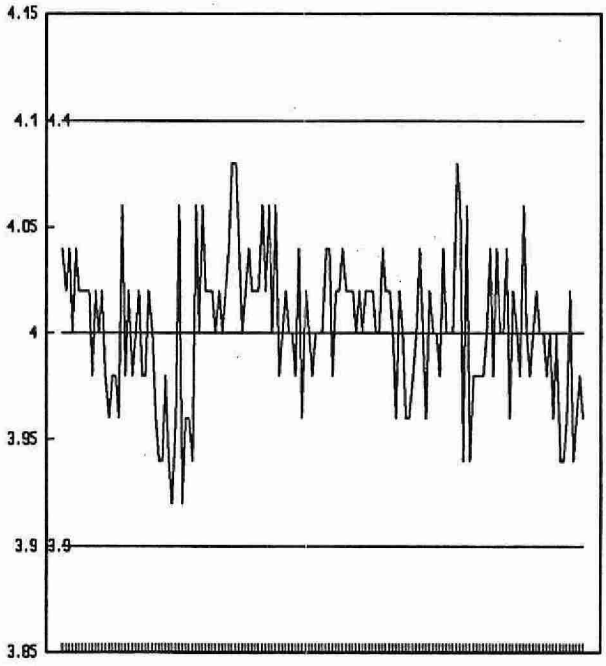
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	157	-0.0006	0.006
Digested Blank	157	0.0059	0.010

PHOSPHORUS, TOTAL (mg/L as P)

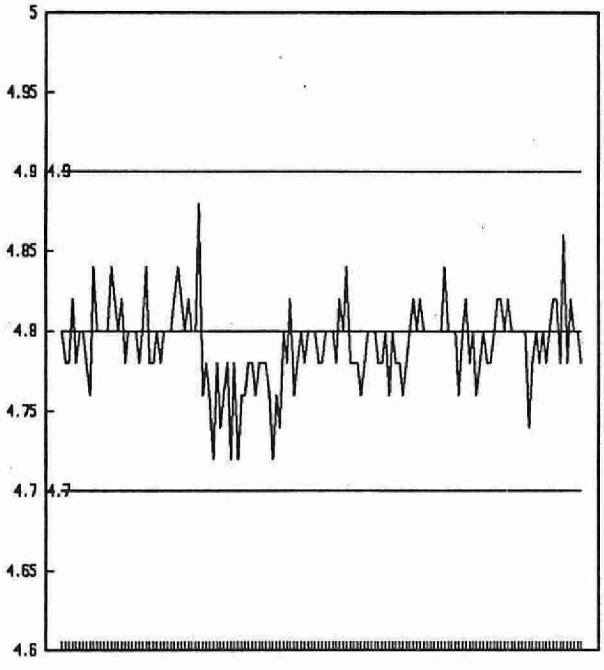
QUALITY CONTROL DATA FROM 03/01/92 TO 30/12/92



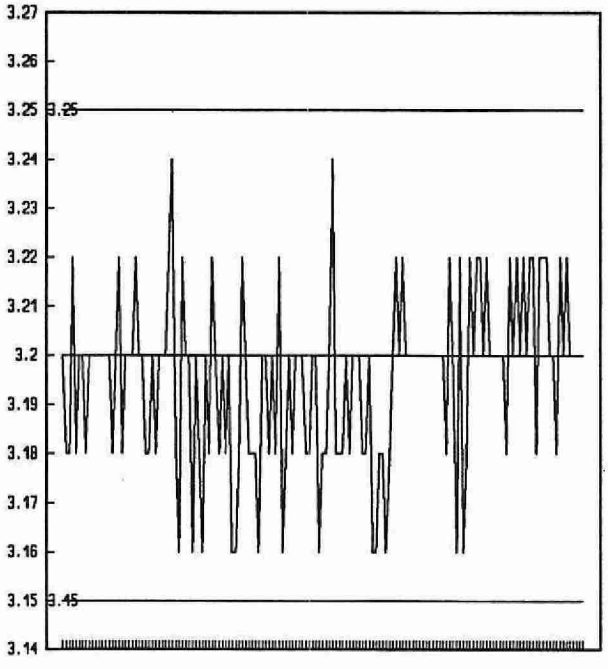
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** PHOSPHORUS, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 22/03/79
LIS Test Name Code	: PPUT1, PPUT2	Units	: µg/L as P
Work Station Code	: DOP	Unit Code	: 063815
Method Code	: 5926C2	Supervisor	: J. McBride
Method Reference No.	: E3036A		
Sample Type/Matrix	: Streams, Lakes, Precipitation		

SAMPLING:

Quantity Required	: 35 mL
Container	: Specially marked Pyrex culture tubes with Teflon-lined caps

ANALYTICAL PROCEDURE:

After withdrawal of excess volume, digestion reagent is added and samples are autoclaved in sulphuric acid-potassium persulphate media at 121°C for 60 min. The orthophosphate content of the digestate is determined colourimetrically by formation of the reduced phospho-antimonyl-molybdate complex using ascorbic acid as the reducing agent.
Approximate absorbance: 0.3 at the full scale level

INSTRUMENTATION:

Autoclave plus basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 880 nm using appropriate phototube. Two analytical ranges are obtained from the output of the colourimeter.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.2 T value: 1

CALIBRATION:

BL plus 7 undigested standards

CONTROLS:

Calibration	: LTBL plus 4 undigested standards, e.g. QCA
Recovery	: 3 digested BL plus 3 digested standards, e.g. R1
Drift	: BL every 10 samples and BL plus 1 undigested standard every 20 samples

NOTES:

System is calibrated with undigested standards, but sample concentrations are adjusted to reflect day's value for digested blank.
The high bias encountered in (A+B) and (A-B) is currently under investigation.

PHOSPHORUS, TOTAL

QUALITY CONTROL DATA FROM 10/01/92 TO 23/12/92

Lab: Dorset Analytical Range: - to 50.0 µg/L as P

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	60	45.0	45.70	0.70	1.654
B :	60	13.5	13.60	0.10	0.659
A+B :	60	59.0	59.30	0.30	1.909
A-B :	60	32.0	32.10	0.10	1.543
C :	60	4.5	4.53	0.03	0.433
B+C :	60	18.0	18.14	0.14	0.938
B-C :	60	9.0	9.07	0.07	0.604

s.d.(AB) S(between runs): 1.3 Sw(within run): 1.1 S/Sw: 1.2

s.d.(CD) S(between runs): 0.6 Sw(within run): 0.4 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

53.5	-	63.5	for	A+B
27.5	-	35.5	for	A-B
16	-	20	for	B+C
7.5	-	10.5	for	B-C

RECOVERIES:

	Number of Data	Expected Concn	Av. Concn Measured	Standard(1) Deviation
R1 :	60	34.5	34.51	1.296
R2 :	60	13.5	13.53	0.586
R3 :	60	6.7	6.67	0.590

DUPLICATES:

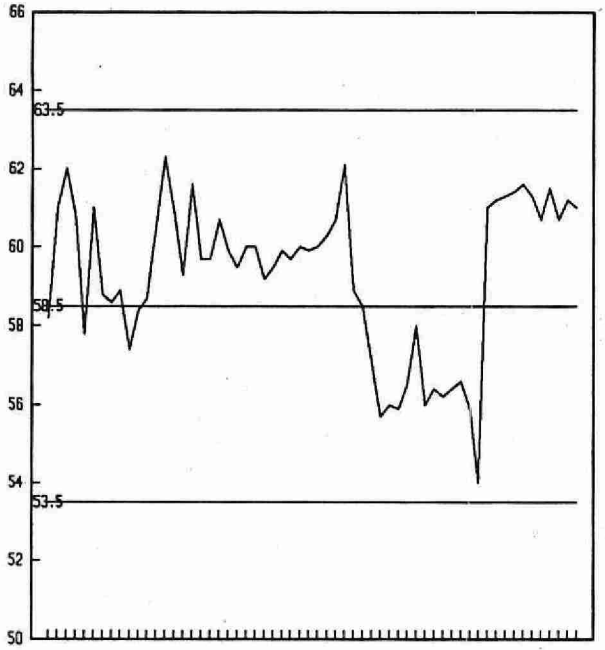
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
48	0.0	-	5.0	0.133	4.0
117	5.0	-	25.0	0.197	1.9
15	25.0	-	50.0	0.212	0.9
180		Overall		0.181	

OTHER CHECKS:

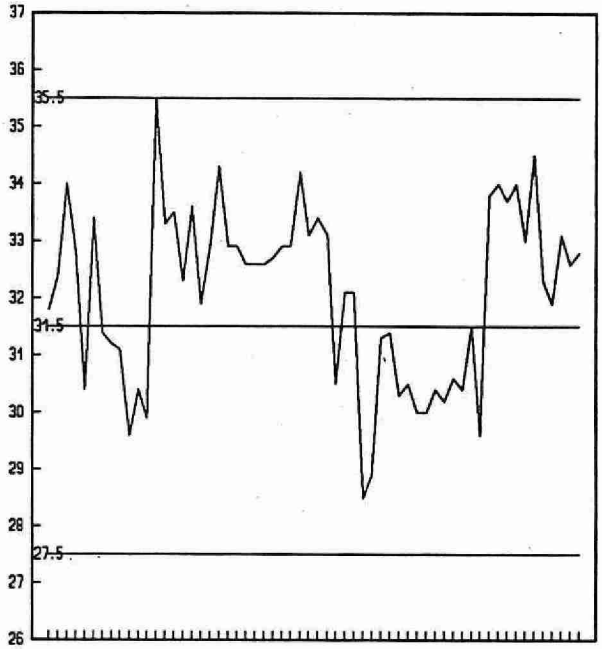
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	60	0.2	0.508
Digested Blank	60	0.6	0.247

PHOSPHORUS, TOTAL (µg/L as P)

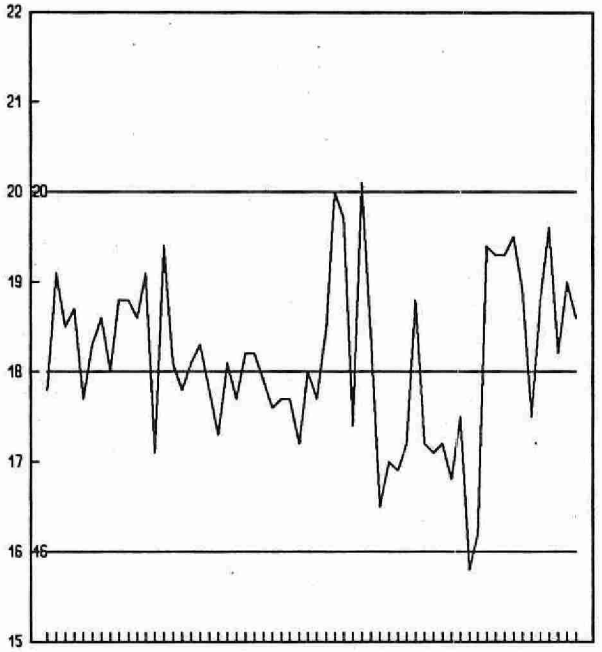
QUALITY CONTROL DATA FROM 10/01/92 TO 23/12/92



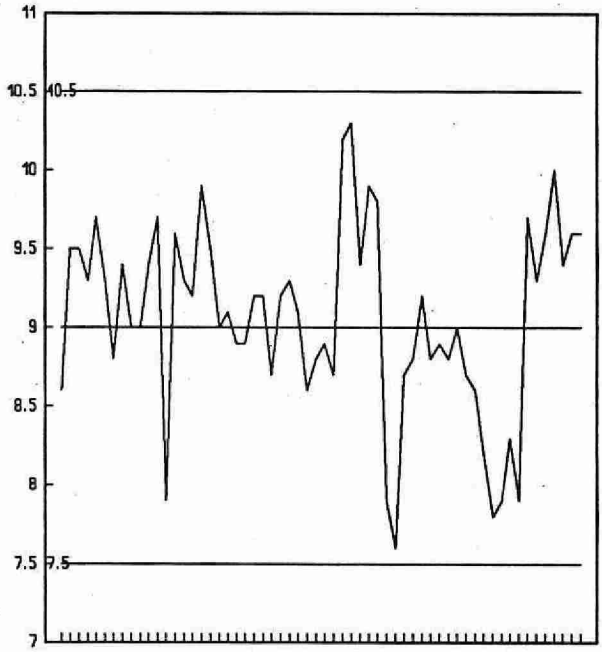
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAA400	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.010

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.005 to 0.002 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.002 or less on the Varian AA 400 instrument.

POTASSIUM

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92

Lab: Atomic Absorption Analytical Range: - to 1.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	41	0.60	0.6012	0.0012	0.0061
B :	41	0.10	0.1013	0.0013	0.0041
A+B :	41	0.70	0.7025	0.0025	0.0083
A-B :	41	0.50	0.4999	-0.0001	0.0062

s.d.(AB) S(between runs): 0.005 Sw(within run): 0.004 S/Sw:1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.671 - 0.728 for A+B
0.478 - 0.522 for A-B

DUPLICATES:

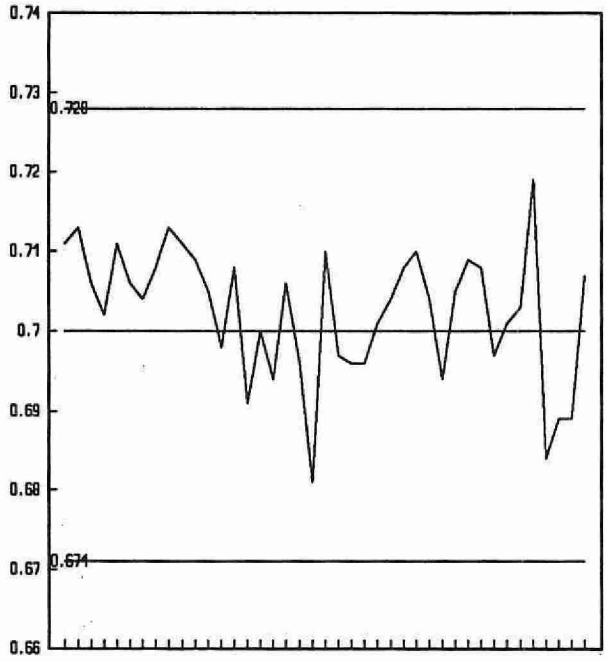
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
82	0.00 - 0.20	0.0016	9.0
20	0.20 - 0.50	0.0024	1.5
8	0.50 - 1.00	0.0100	1.2
110	Overall	0.0021	

OTHER CHECKS:

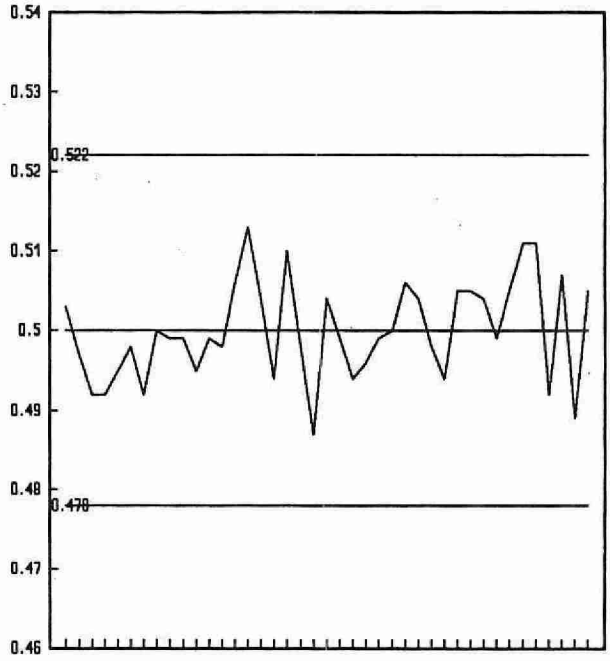
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	41	-0.0002	0.0028

POTASSIUM (mg/L as K)

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: PRAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.01 to 0.005 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.005 or less on the Varian AA 400 instrument.

Quality Control limits were changed in June 17, 1992. Qc data prior to this date were under the control of former limits.

POTASSIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92

Lab: Atomic Absorption Analytical Range: - to 1.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	90	0.80	0.801	0.001	0.0081
B :	90	0.20	0.201	0.001	0.0039
A+B :	90	1.00	1.001	0.001	0.0097
A-B :	90	0.60	0.601	0.001	0.0081
C :	90	0.05	0.051	0.001	0.0028
B+C :	90	0.25	0.251	0.001	0.0051
B-C :	90	0.15	0.150	0.000	0.0044

s.d.(AB) S(between runs): 0.0063 Sw(within run): 0.0057 S/Sw: 1.1

s.d.(BC) S(between runs): 0.0033 Sw(within run): 0.0031 S/Sw: 1.08

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.973	-	1.027	for	A+B
0.580	-	0.620	for	A-B
0.228	-	0.272	for	B+C
0.134	-	0.166	for	B-C

DUPLICATES:

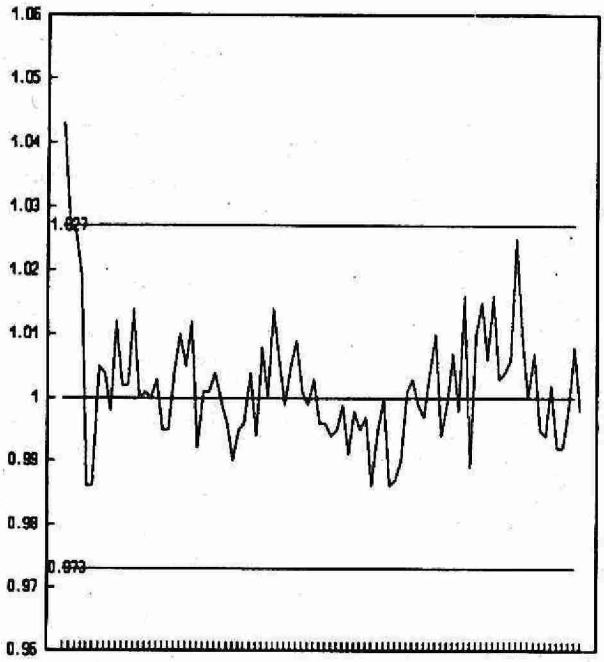
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
63	0.00 - 0.20	0.0031	3.6
116	0.20 - 0.50	0.0052	2.5
67	0.50 - 1.00	0.0089	1.4
246	Overall	0.0055	

OTHER CHECKS:

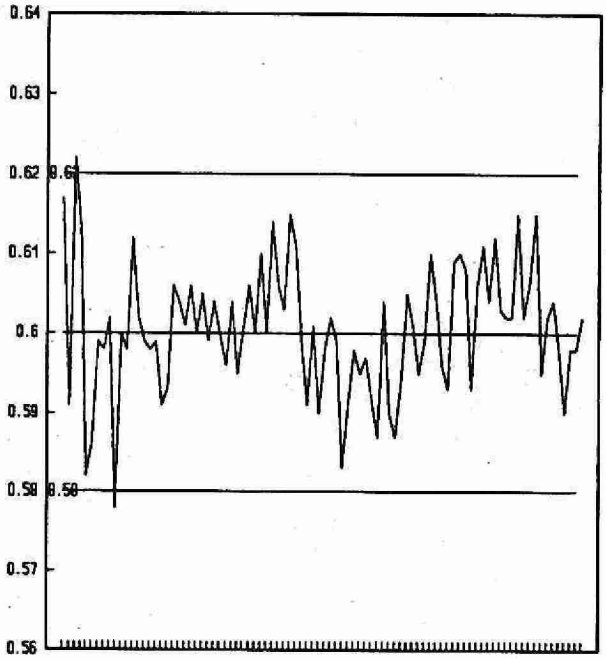
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	90	-0.0002	0.007

POTASSIUM (mg/L as K)

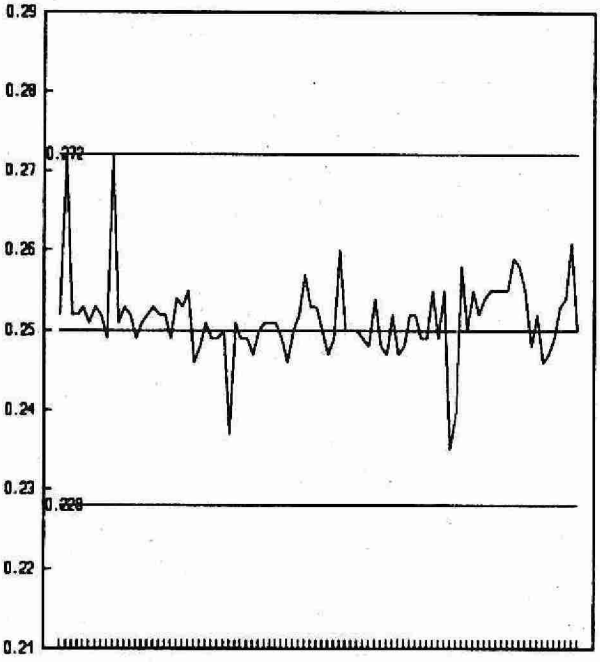
QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92



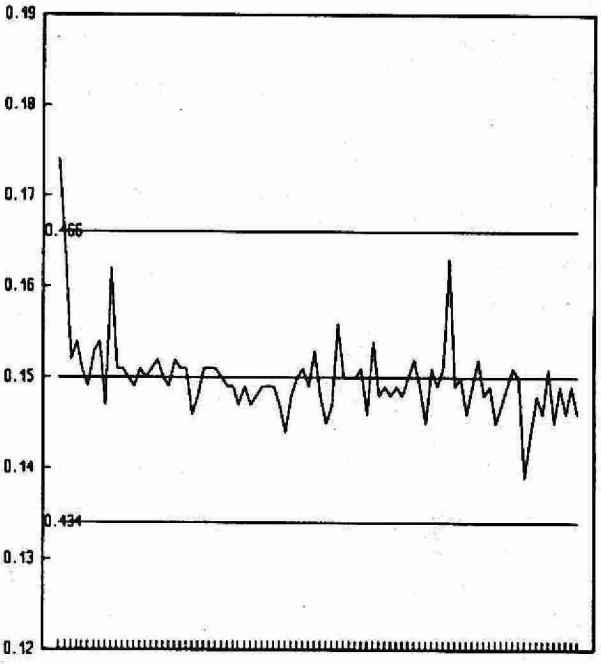
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: KKUR	Units	: µg/Filter as K
Work Station Code	: PRLOVAA	Unit Code	: 361819
Method Code	: 004BA3	Supervisor	: J. McBride
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at workstation PRAA400, at 766.5 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train. Results are converted to µg/filter as K.

Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard 10 samples

NOTES:

W and T values are those of the PRAA400 workstation multiplied by 50 to yield µg/filter.

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: RMAAS	Unit Code	: 064819
Method Code	: 0905A1	Supervisor	: J. McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.923 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

POTASSIUM

QUALITY CONTROL DATA FROM 10/01/92 TO 30/12/92

Lab: Atomic Absorption Analytical Range: - to 5.00 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	158	4.00	4.000	0.000	0.0475
B :	158	1.00	1.006	0.006	0.0153
A+B :	158	5.00	5.006	0.006	0.0532
A-B :	158	3.00	2.994	-0.006	0.0463
C :	158	0.25	0.253	0.003	0.0073
B+C :	158	1.25	1.259	0.004	0.0187
B-C :	158	0.75	0.753	0.003	0.0151

s.d.(AB) S(between runs): 0.035 Sw(within run): 0.033 S/Sw: 1.08

s.d.(BC) S(between runs): 0.012 Sw(within run): 0.011 S/Sw: 1.12

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.770	-	5.230	for	A+B
2.850	-	3.150	for	A-B
1.175	-	1.325	for	B+C
0.700	-	0.800	for	B-C

DUPLICATES:

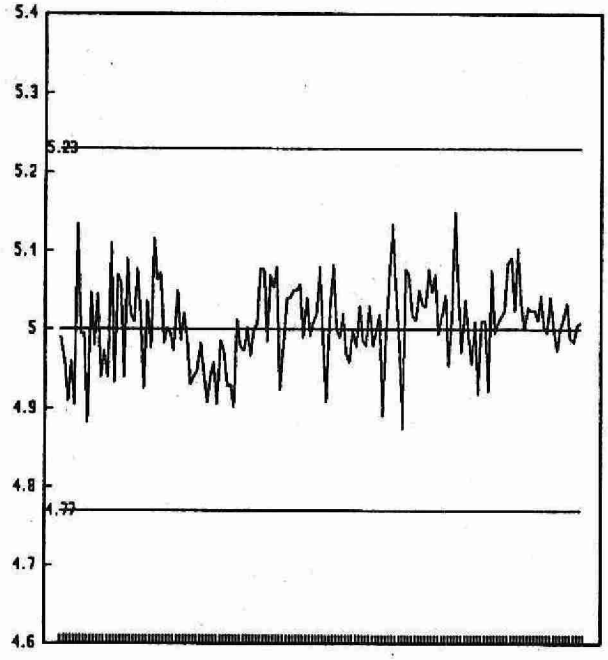
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
50	0.00	-	0.25	0.0080	18.0
136	0.25	-	1.00	0.0127	9.0
200	1.00	-	2.50	0.0253	4.0
78	2.50	-	5.00	0.0643	3.0
464	Overall			0.0243	

OTHER CHECKS:

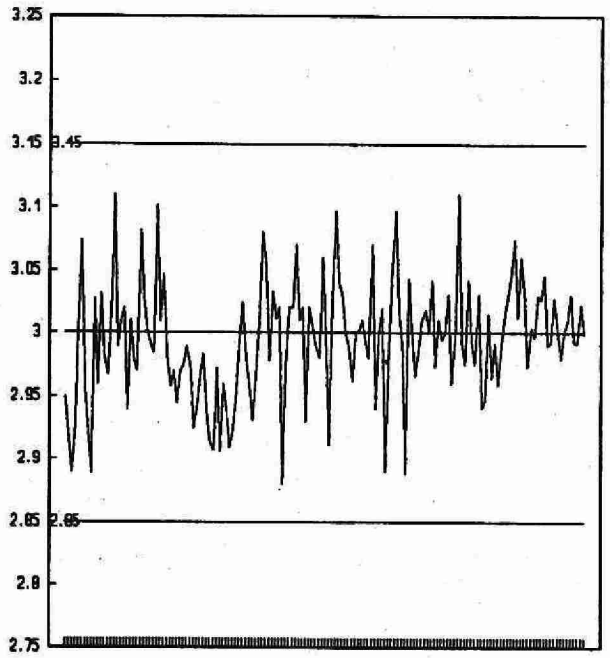
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	157	0.008	0.0157

POTASSIUM (mg/L as K)

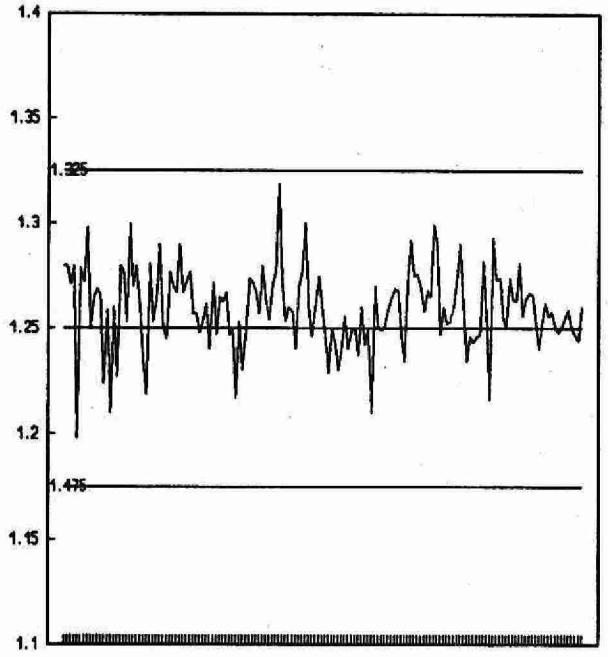
QUALITY CONTROL DATA FROM 02/01/91 TO 30/12/91



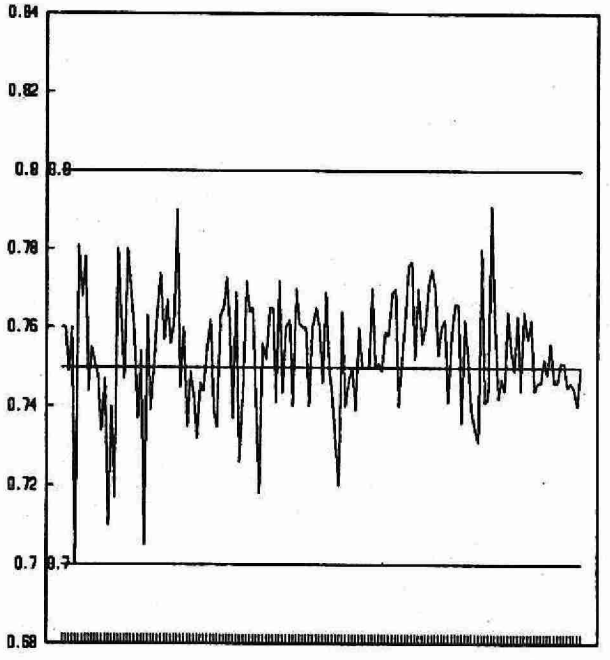
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** POTASSIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: KKUR	Units	: mg/L as K
Work Station Code	: WAAS	Unit Code	: 064819
Method Code	: 002EA1	Supervisor	: J. McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents,Sewage,Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 766.5 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 standards; 2 standards every 20 samples

POTASSIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92

Lab: Atomic Absorption Analytical Range: - to 25.0 mg/L as K

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	100	20.00	19.93	-0.07	0.3207
B :	100	5.00	5.02	0.02	0.1029
A+B :	100	25.00	24.96	-0.04	0.3554
A-B :	100	15.00	14.90	-0.10	0.3171
C :	100	1.25	1.26	0.01	0.0705
B+C :	100	6.25	6.28	0.03	0.1458
B-C :	100	3.75	3.77	0.02	0.0992

s.d.(AB) S(between runs): 0.24 Sw(within run): 0.22 S/Sw: 1.1

s.d.(BC) S(between runs): 0.09 Sw(within run): 0.07 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

23.8	-	26.2	for	A+B
14.2	-	15.8	for	A-B
5.65	-	6.85	for	B+C
3.35	-	4.15	for	B-C

DUPLICATES:

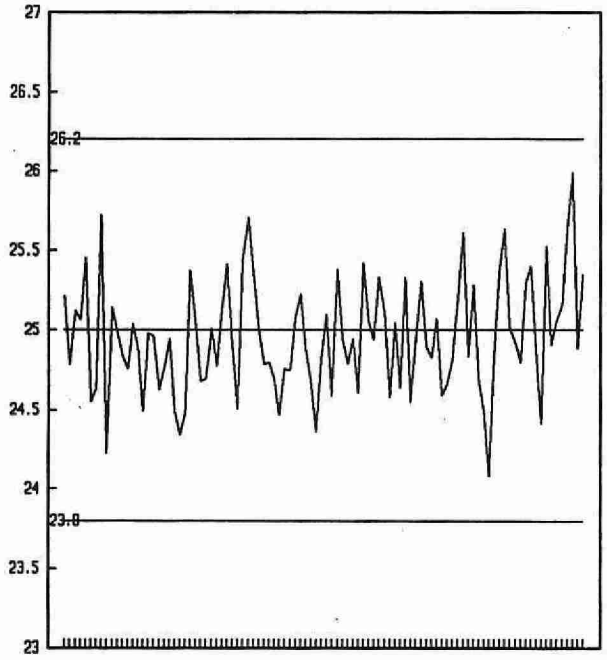
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
99	0.00	-	1.25	0.0551	8.5
67	1.25	-	2.50	0.0599	3.5
60	2.50	-	5.00	0.0943	5.7
28	5.00	-	25.00	0.1722	2.4
254	Overall			0.0775	

OTHER CHECKS:

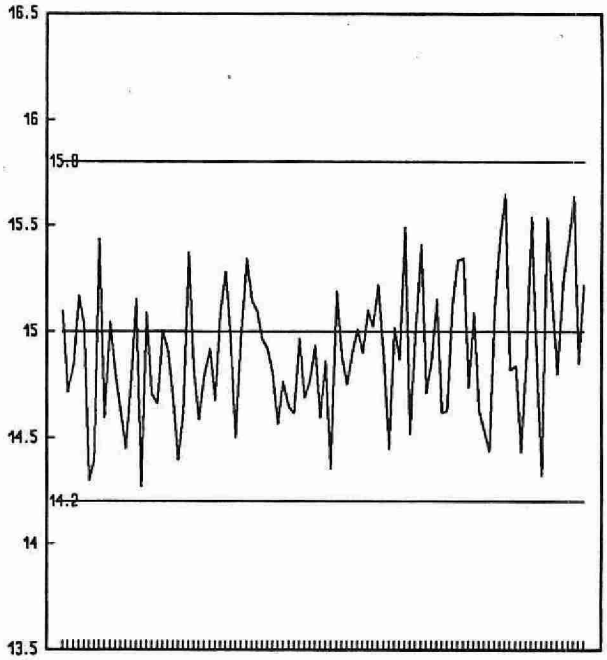
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	100	-0.031	0.0737

POTASSIUM (mg/L as K)

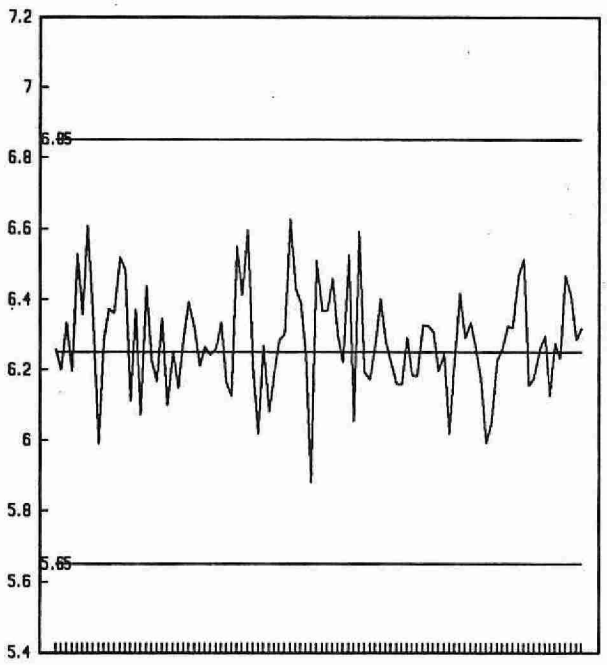
QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92



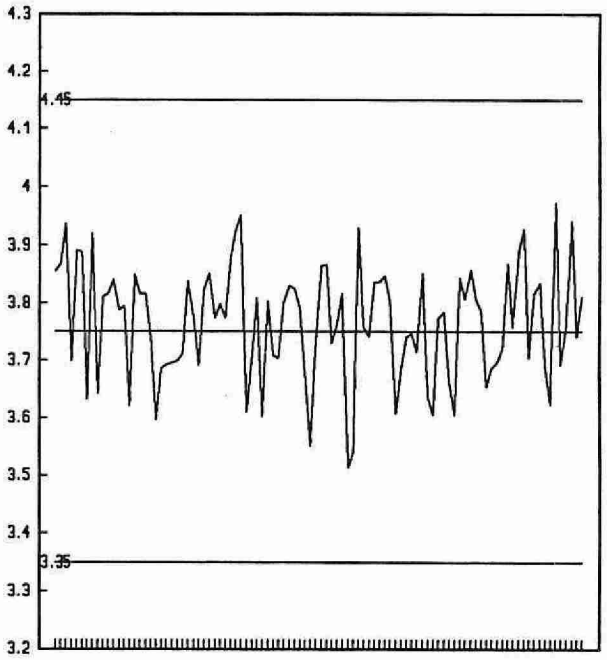
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SILICON, REACTIVE SILICATES ***

IDENTIFICATION:

Laboratory	: Colourimetry	Method Introduced	: 01/02/75
LIS Test Name Code	: SIO3UR	Units	: mg/L as Si
Work Station Code	: ROM	Unit Code	: 064814
Method Code	: 001BC1	Supervisor	: M. Rawlings
Method Reference No.	: E3176A		
Sample Type/Matrix	: Rivers, Lakes, Precipitation, Soil Extracts, Effluents Domestic Water Supplies, Leachates		

SAMPLING:

Quantity Required	: 10 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Reactive silicates are determined by formation of a reduced molybdo-silicate complex at pH 1.6, using ascorbic acid as the reducing agent, and oxalic acid to suppress phosphate interference.
Approximate absorbance: 0.7 at the full scale level.
Dissolved inorganic and dissolved organic carbon are determined simultaneously.

INSTRUMENTATION:

Basic automated modular continuous flow system with colourimetric measurement through a 5.0 cm. light path at 660 nm. Data capture, reduction, and processing via a multi-stage microcomputer system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; standards every 20 samples

NOTES:

Calibration standard is a hydrate: $Na_2SiO_3.9H_2O$.

SILICON, REACTIVE SILICATES

QUALITY CONTROL DATA FROM 03/01/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 10.0 mg/L as Si

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	153	8.0	8.05	0.05	0.080
B :	153	2.0	2.03	0.03	0.033
A+B :	153	10.0	10.08	0.08	0.095
A-B :	153	6.0	6.02	0.02	0.078
C :	153	0.5	0.497	-0.003	0.024
B+C :	153	2.5	2.52	0.02	0.055
B-C :	153	1.5	1.53	0.03	0.020

s.d.(AB) S(between runs): 0.061 Sw(within run): 0.06 S/Sw: 1.1

s.d.(BC) S(between runs): 0.03 Sw(within run): 0.01 S/Sw: 2.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.70	-	10.30	for	A+B
5.80	-	6.20	for	A-B
2.30	-	2.70	for	B+C
1.38	-	1.62	for	B-C

DUPLICATES:

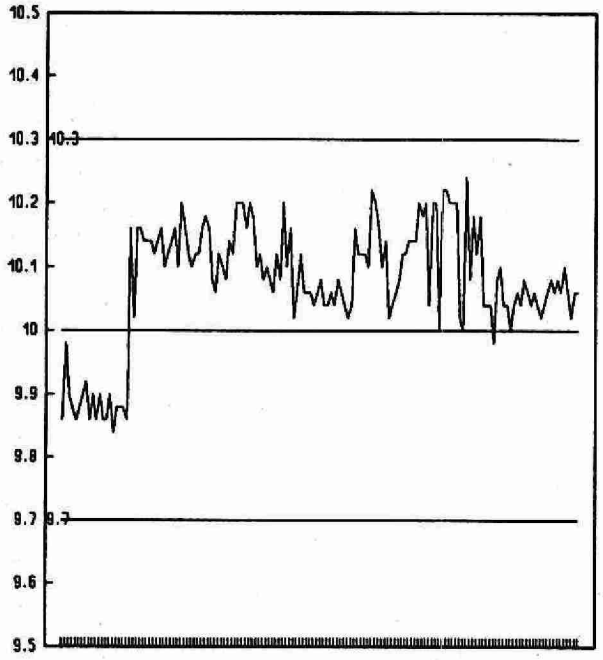
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
142	0.00	-	1.00	0.010	2.5
215	1.00	-	5.00	0.014	0.9
56	5.00	-	10.00	0.037	0.7
413	Overall			0.026	

OTHER CHECKS:

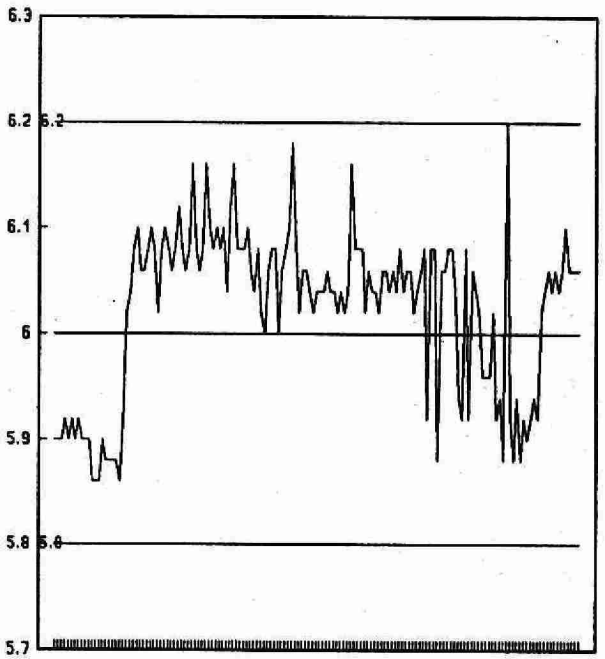
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	153	-0.0465	0.0162

SILICON, REACTIVE SILICATES (mg/L as Si)

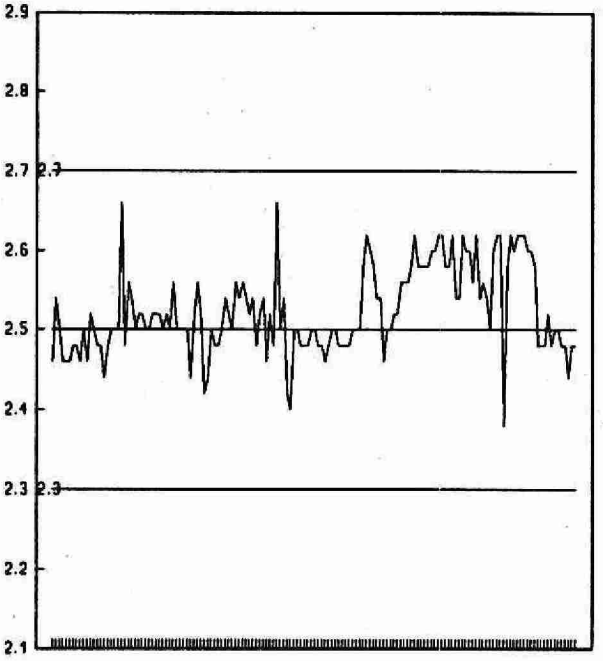
QUALITY CONTROL DATA FROM 03/01/92 TO 23/12/92



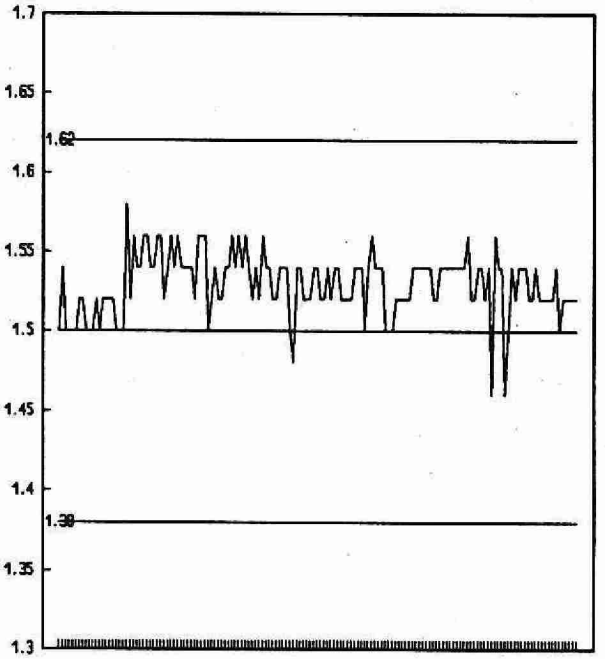
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 18/05/79
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAA400	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J. McBride
Method Reference No	: E3146A		
Sample Type/Matrix	: Precipitation, Throughfall, Filter extracts		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.002 T value: 0.010

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.005 to 0.002 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.002 or less on the Varian 400 instrument.

SODIUM

QUALITY CONTROL DATA FROM 15/01/92 TO 31/12/92

Lab: Colourimetry Analytical Range: - to 1.00 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	42	0.60	0.6017	0.0017	0.0059
B :	42	0.10	0.1062	0.0062	0.0058
A+B :	42	0.70	0.7079	0.0079	0.0083
A-B :	42	0.50	0.4955	-0.0045	0.0083

s.d.(AB) Sw(within run): 0.0058 S(between runs): 0.0059 S/Sw: 1.0

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.671 - 0.729 for A+B
0.478 - 0.522 for A-B

DUPLICATES:

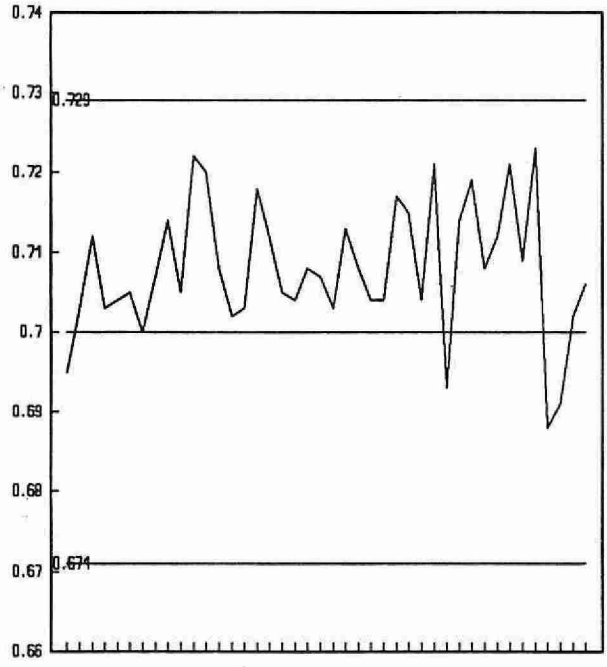
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
88	0.00 - 0.10	0.0019	6.5
22	0.10 - 0.50	0.0028	1.6
7	0.50 - 1.00	0.0061	1.1
117	Overall	0.0022	

OTHER CHECKS:

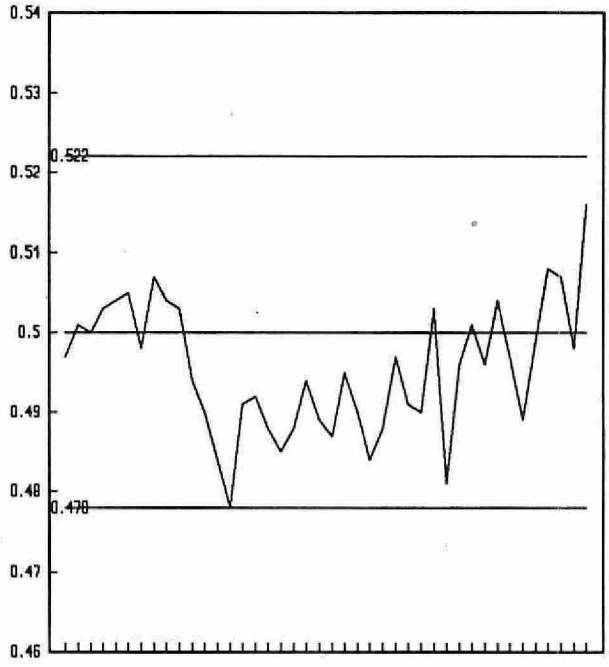
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	42	-0.00079	0.0024

SODIUM (mg/L as Na)

QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 20/07/88
LIS Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: PRAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3249A		
Sample Type/Matrix	: Rivers, Lakes		

SAMPLING:

Quantity Required	: 5 mL
Container	: Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm with an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.005 T value: 0.025

CALIBRATION:

BL plus 5 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g., QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W value was changed from 0.01 to 0.005 in Feb. 1992, based on 2 years of low range duplicate data showing mean standard deviation at 0.005 on the Varian AA 400 instrument.

Quality Control limits were changed on June 17, 1992. QC data prior to this date were under the control of former limits.

SODIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92

Lab: Atomic Absorption Analytical Range: - to 4.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	89	3.2	3.204	0.004	0.0253
B :	89	0.8	0.805	0.005	0.0091
A+B :	89	4.0	4.008	0.008	0.0286
A-B :	89	2.4	2.399	-0.001	0.0250
C :	89	0.2	0.201	0.001	0.0051
B+C :	89	1.0	1.006	0.006	0.0101
B-C :	89	0.6	0.603	0.003	0.0107

s.d.(AB) S(between runs): 0.019 Sw(within run): 0.018 S/Sw:1.1

s.d.(BC) S(between runs): 0.007 Sw(within run): 0.008 S/Sw:0.97

On any given day the calibration is accepted if the values obtained lie within the ranges:

3.91	-	4.09	for	A+B
2.33	-	2.47	for	A-B
0.958	-	1.04	for	B+C
0.568	-	0.632	for	B-C

DUPLICATES:

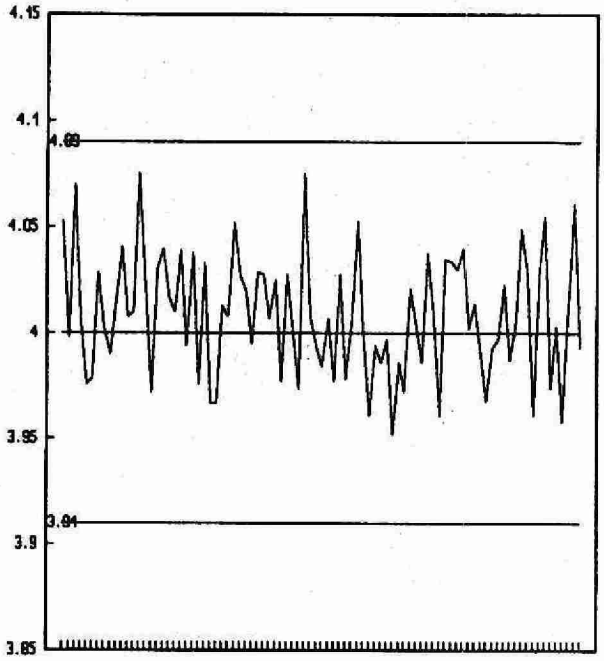
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
44	0.00 - 0.60	0.0092	2.7
88	0.60 - 1.00	0.0134	3.2
68	1.00 - 2.00	0.0179	1.2
34	2.00 - 4.00	0.0599	2.1
234	Overall	0.0180	

OTHER CHECKS:

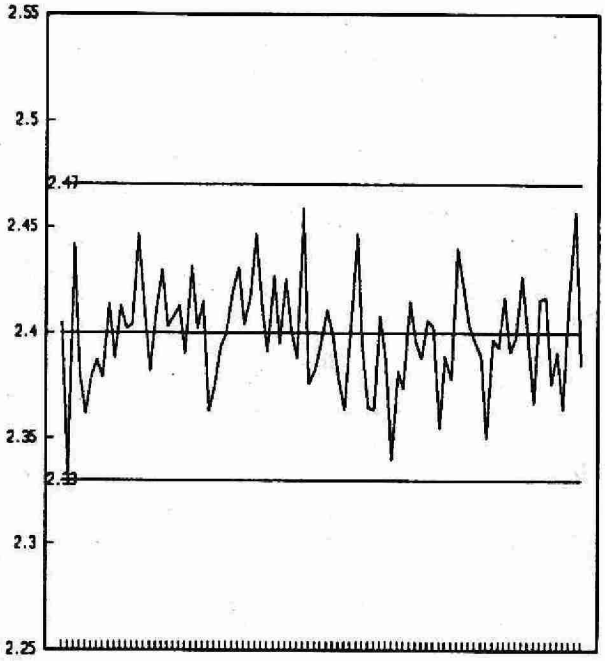
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	89	0.0062	0.0649

SODIUM (mg/L as Na)

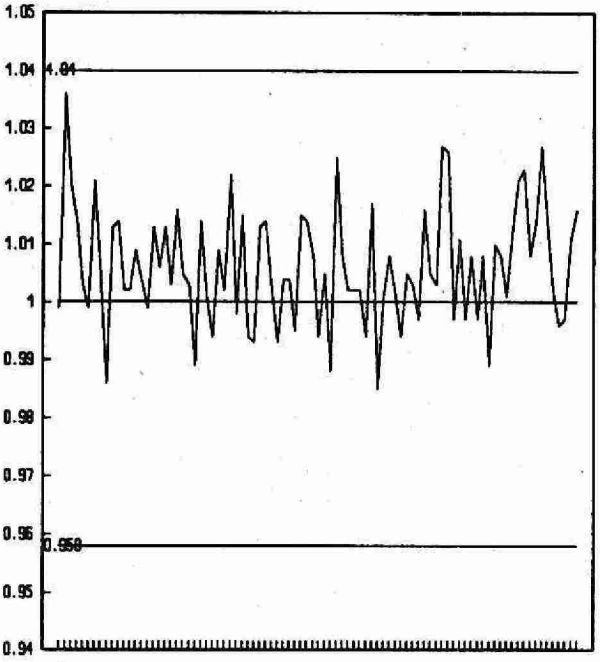
QUALITY CONTROL DATA FROM 02/01/92 TO 29/12/92



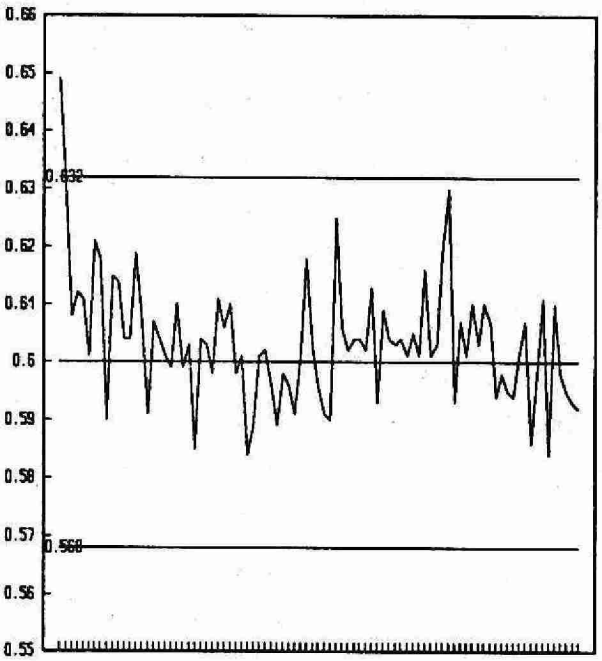
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 18/05/79
LIS Test Name Code	: NAUR	Units	: µg/Filter as Na
Work Station Code	: PRLOVAA	Unit Code	: 361811
Method Code	: 004AA3	Supervisor	: J. McBride
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL Polyethylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polyethylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at workstation PRAA400, at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train. Results are converted to µg/filter as Na.
Approximate absorbance: 0.5 at the full scale level.

INSTRUMENTATION:

Automated modular atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.1 T value: 0.5

CALIBRATION:

BL plus 5 standards.

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: BL, reslope standard every 10 samples.

NOTES:

W and T values are those of the PRAA400 workstation multiplied by 50 to yield µg/filter.

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 01/04/74
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: RMAAS	Unit Code	: 064811
Method Code	: 0905A1	Supervisor	: J. McBride
Method Reference No.	: E3171A		
Sample Type/Matrix	: Rivers, Lakes, Soil Extracts, Stemflow.		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.16 at the full scale value.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.02 T value: 0.1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

SODIUM

QUALITY CONTROL DATA FROM 10/01/92 TO 30/12/92

Lab: Atomic Absorption Analytical Range: - to 20.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	158	16.0	15.985	-0.015	0.1431
B :	158	4.0	4.026	0.026	0.0515
A+B :	158	20.0	20.011	0.011	0.1571
A-B :	158	12.0	11.959	-0.041	0.1470
C :	158	1.0	1.013	0.013	0.0232
B+C :	158	5.0	5.039	0.039	0.0653
B-C :	158	3.0	3.013	0.013	0.0461

s.d.(AB) S(between runs): 0.11 Sw(within run): 0.10 S/Sw: 1.0

s.d.(BC) S(between runs): 0.04 Sw(within run): 0.03 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

19.4	-	20.6	for	A+B
11.6	-	12.4	for	A-B
4.7	-	5.3	for	B+C
2.8	-	3.2	for	B-C

DUPLICATES:

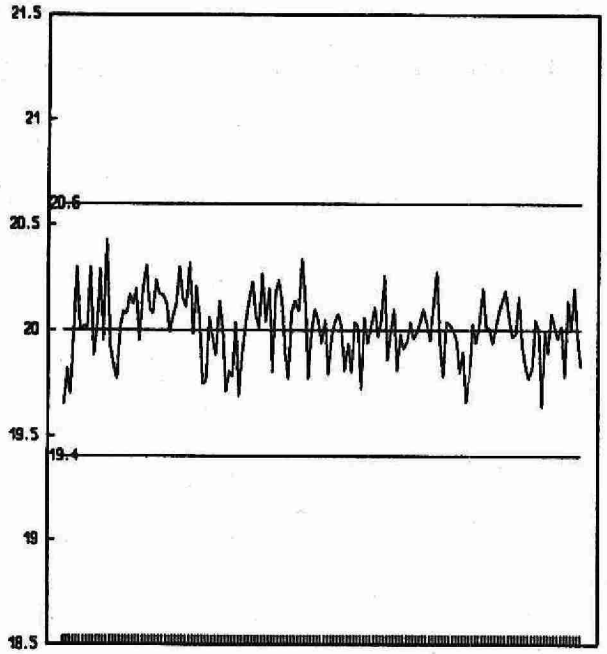
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
89	0.00	-	1.00	0.0153	5.7
38	1.00	-	2.00	0.0316	2.3
85	2.00	-	5.00	0.0795	2.7
120	5.00	-	10.00	0.1126	2.1
103	10.00	-	20.00	0.1781	1.4
435	Overall			0.0923	

OTHER CHECKS:

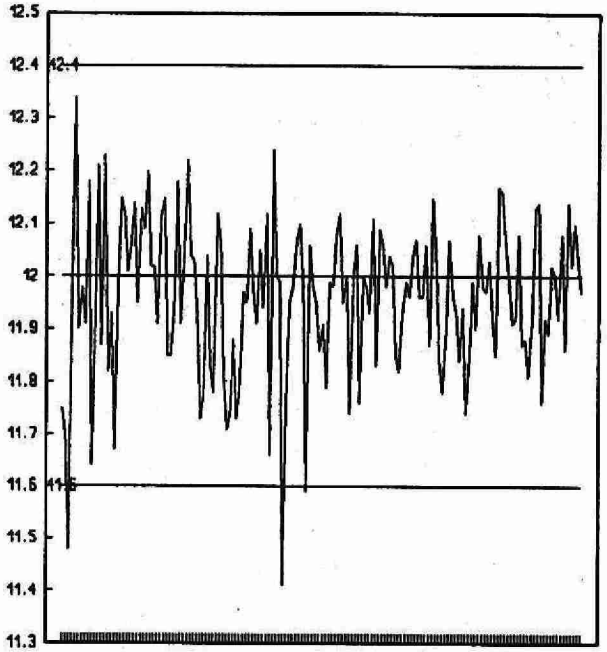
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	158	0.0137	0.0803

SODIUM (mg/L as Na)

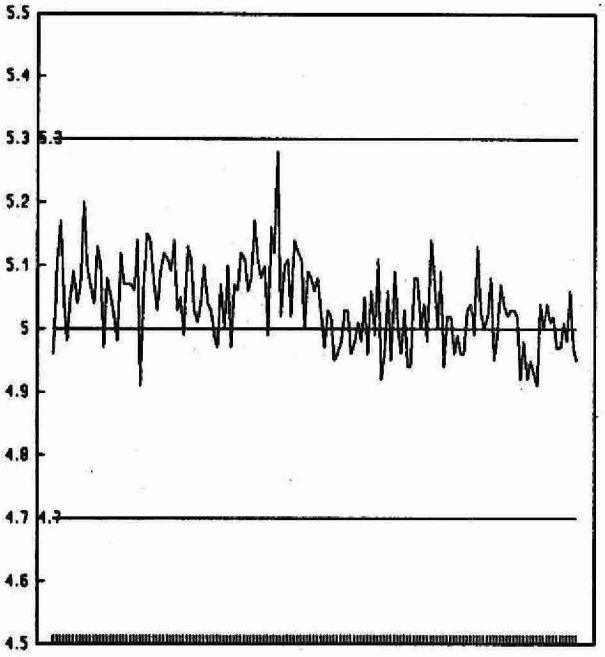
QUALITY CONTROL DATA FROM 10/01/92 TO 30/12/92



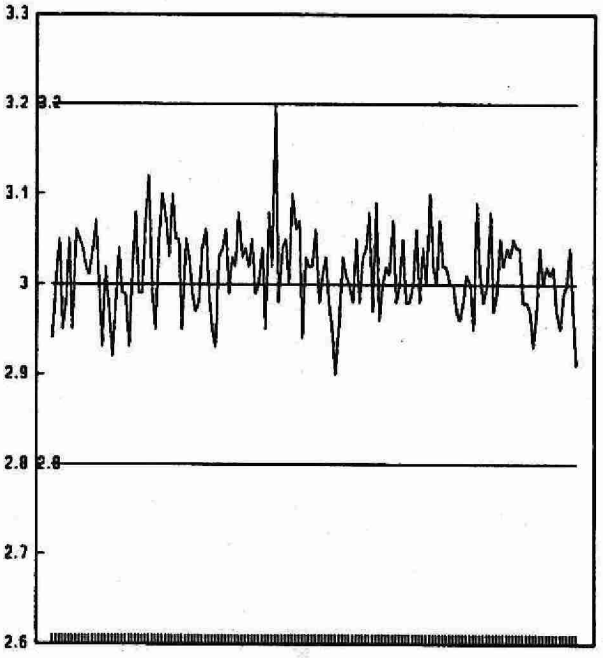
QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B



QUALITY CONTROL STANDARD C+D



QUALITY CONTROL STANDARD C-D

CONTROL LIMIT

*** SODIUM ***

IDENTIFICATION:

Laboratory	: Atomic Absorption	Method Introduced	: 08/04/86
Lis Test Name Code	: NAUR	Units	: mg/L as Na
Work Station Code	: WAAS	Unit Code	: 064811
Method Code	: 001EA1	Supervisor	: J.McBride
Method Reference No.	: E3217A		
Sample Type/Matrix	: Domestic Waters, Leachates, Effluents,Sewage,Industrial wastes		

SAMPLING:

Quantity Required	: 6 mL
Container	: Glass or Plastic

ANALYTICAL PROCEDURE:

Samples are analyzed by AAS at 589.0 nm using an air-acetylene flame. Cesium chloride is added as a suppressant via an automated sampling train.
Approximate absorbance: 1.21 at the full scale level.

INSTRUMENTATION:

Automated flow injection atomic absorption spectrophotometer (AAS) system.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.2 T value: 1

CALIBRATION:

BL plus 11 standards

CONTROLS:

Calibration	: LTBL plus 3 standards, e.g. QCA
Drift	: BL every 10 samples; 2 standards every 20 samples

SODIUM

QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92

Lab: Atomic Absorption Analytical Range: - to 100.0 mg/L as Na

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	129	80.0	79.80	-0.20	1.0719
B :	129	20.0	20.01	0.01	0.4872
A+B :	129	100.0	99.81	-0.19	1.2630
A-B :	129	60.0	59.79	-0.21	1.0851
C :	129	5.0	5.01	0.01	0.3743
B+C :	129	25.0	25.03	0.03	0.6894
B-C :	129	15.0	15.00	0.00	0.5260

s.d.(AB) S(between run): 0.83 Sw(within run): 0.77 S/Sw: 1.1

s.d.(BC) S(between run): 0.43 Sw(within run): 0.37 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

95.50	-	104.50	for	A+B
57.00	-	63.00	for	A-B
22.25	-	27.75	for	B+C
13.50	-	16.50	for	B-C

DUPLICATES:

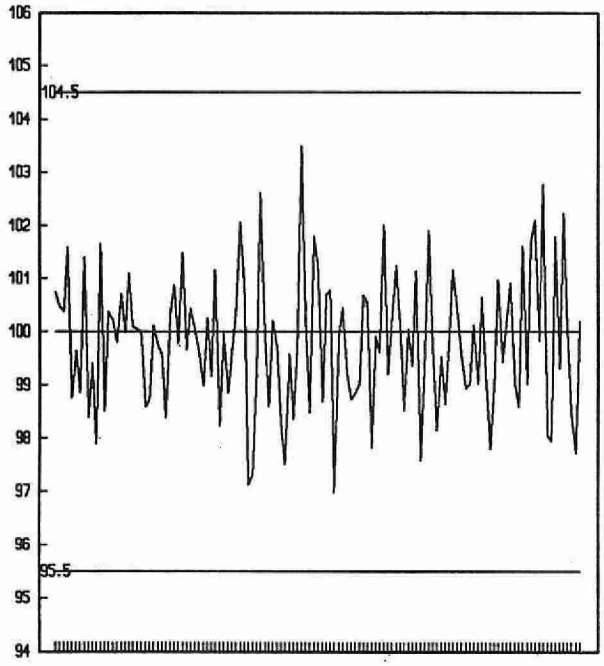
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
126	0.0	-	10.0	0.2776	5.1
87	10.0	-	25.0	0.4118	2.4
62	25.0	-	50.0	0.7704	2.0
32	50.0	-	100.0	1.3095	1.9
307	Overall			0.4883	

OTHER CHECKS:

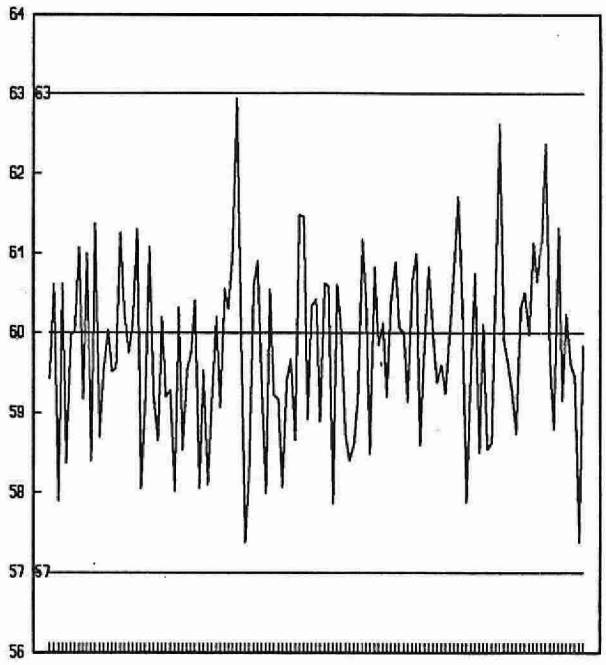
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	129	-0.2043	0.4174

SODIUM (mg/L as Na)

QUALITY CONTROL DATA FROM 02/01/92 TO 18/12/92



QUALITY CONTROL STANDARD A+B



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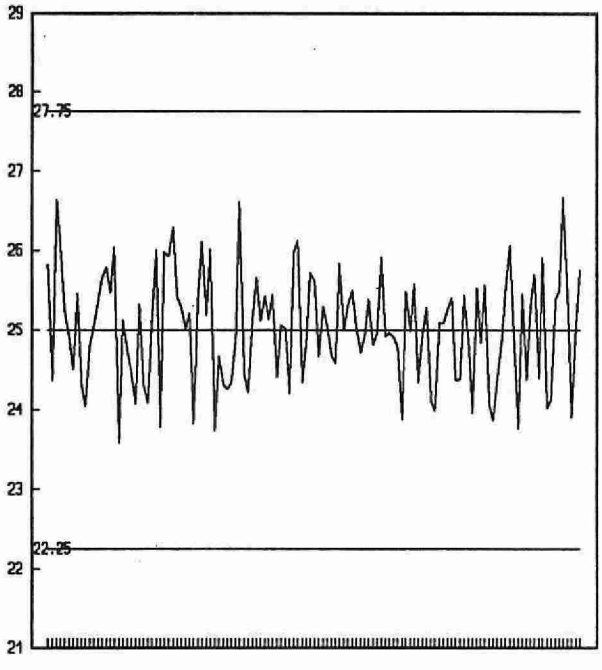
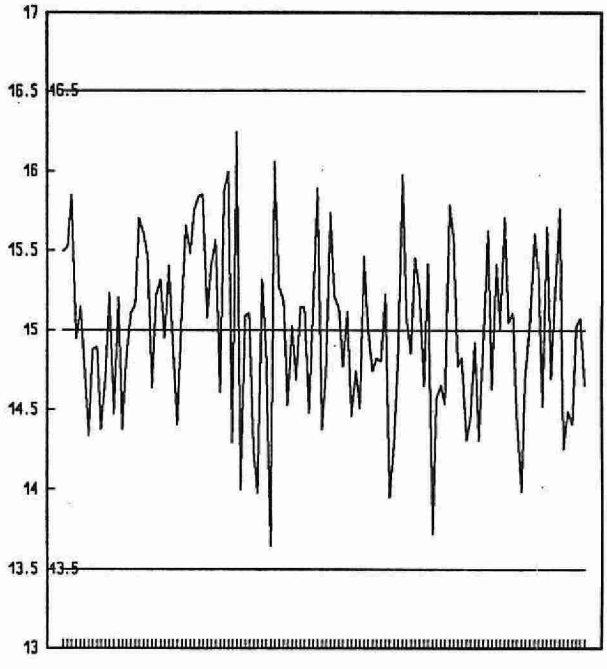


QUALITY CONTROL STANDARD B+C



QUALITY CONTROL STANDARD B-C

CONTROL LIMIT

*** SOLIDS, DISSOLVED ***

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '61
LIS Test Name Code	: RSF	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 106AB4	Supervisor	: J.McBride
Method Reference No	: E3188A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Surface Waters, Leachates		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sample is filtered under moderate suction through a Whatman 934AH glass fibre filter. 50 or 100 mL of filtrate is pipetted into a preweighed Teflon dish, dried at 103-105^{0}C, and stored in a desiccator for at least 24 hours. After reweighing the dish the dissolved solids content is calculated by subtracting the original dish mass from the dried dish mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), drying oven, suction filtration apparatus, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Recovery	: LTBL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every 10 dishes.

NOTES:

Correction factor for dish tare weights is included in the calculation, based on variations of a standard sealed vessel.
Two balances are used for all solids analyses. Currently tests on sewage samples were performed by a private laboratory until Nov. 1992. QC results reported here represent only tests performed at the Central Laboratory.
Duplicates in the lowest range class were generally too high to use to recalculate the W value.

SOLIDS, DISSOLVED

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Solids Analytical Range: 2 - to 5000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured	Av. Bias	Standard(1) Deviation
A :	105	50.00	50.00000	0.00000	0.00008
B :	105	30.00	29.99984	-0.00016	0.00006
A+B :	105	80.00	79.99992	-0.00008	0.00013
A-B :	105	20.00	20.00016	0.00016	0.00006

s.d.(AB) S(between runs): 0.00007 Sw(within run): 0.00004 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.99900 - 80.00100 for A+B
19.99925 - 20.00075 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured	Standard(1) Deviation
R1 :	103	2000.0	1995.6	7.2
R2 :	103	500.0	498.8	5.3

DUPLICATES:

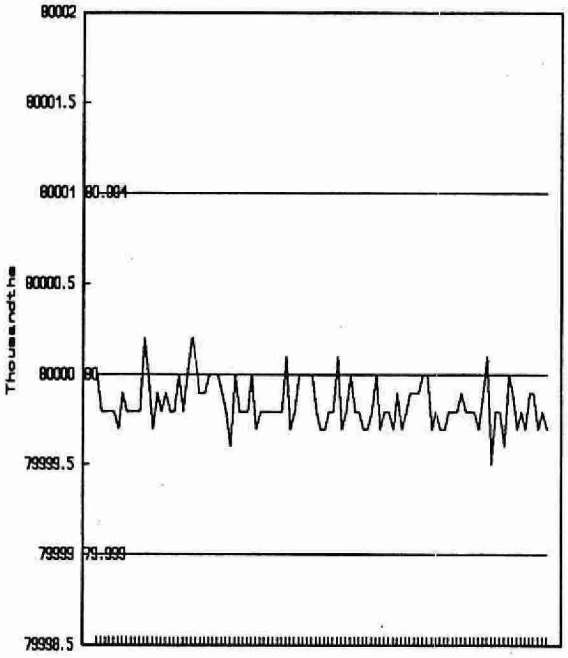
Number of Data Pairs	Sample Concn Span (mg/L)	Mean(2) s.d.	Coefficient of var.(%)
24	0 - 250	2.71	3.0
34	250 - 500	7.12	2.1
62	500 - 1000	11.18	2.0
29	1000 - 5000	43.61	6.1
149	Overall	10.89	

OTHER CHECKS:

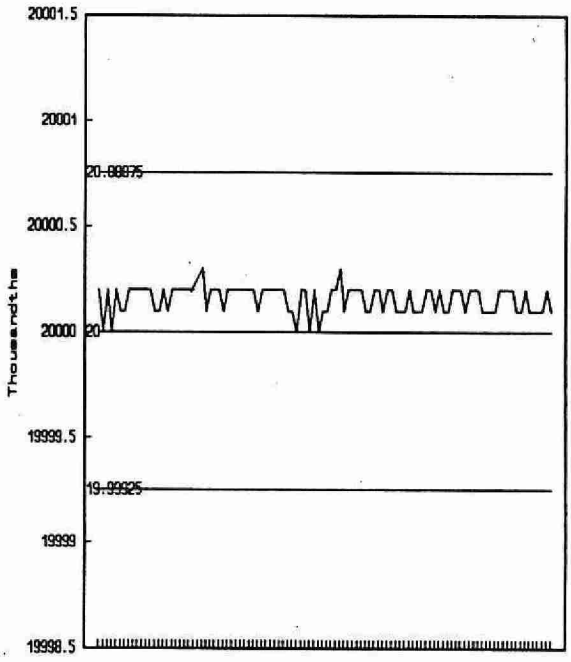
	Number of Data	Data Mean	Standard(1) Deviation
Blank	103	-0.20447	3.855

SOLIDS, DISSOLVED (mg/L)

QUALITY CONTROL DATA FROM 01/01/92 TO 30/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SOLIDS, IGNITED ***
(Particulate Ash)

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSPA	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 207AB5	Supervisor	: J. McBride
Method Reference No.	: E3194A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for particulate solids (RSP) is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The particulate ash (fixed) is the difference between the final ignited mass plus filter and the original tare weight of the filter, divided by the original sample volume (mL) used for RSP. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), muffle furnace, ceramic dishes, Petri dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Drift	: Balance zero is checked at least every 20 dishes.

NOTES:

Tests on sewage samples were performed by a private laboratory, until Nov. 1992. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS, IGNITED
(Particulate Ash)

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Solids Analytical Range: - to 7,000 mg/L

CALIBRATION CONTROL

	Number of Data	Expected Mass (g)	Av. Mass Measured	Standard(1) Deviation
A :	49	0.50	0.49999	0.000010
B :	49	0.05	0.04991	0.000009
A+B :	49	0.55	0.54998	0.000015
A-B :	49	0.45	0.44999	0.000011

s.d.(AB) S(between runs): 0.000009 Sw(within run): 0.000008 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

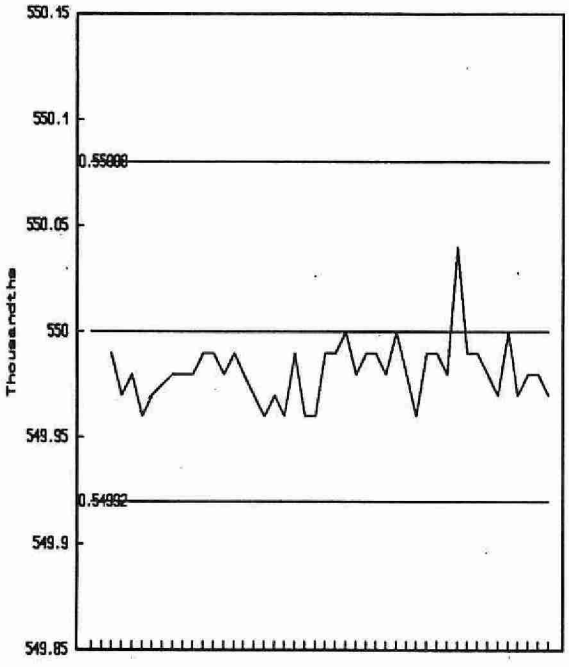
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
15	0.0	-	5.0	0.5241	14.9
48	5.0	-	25.0	1.0217	12.1
27	25.0	-	100.0	3.3192	6.6
8	100.0	-	1000.0	16.6092	6.8
4	1000.0	-	7000.0	80.3987	1.6
102	Overall			1.8712	

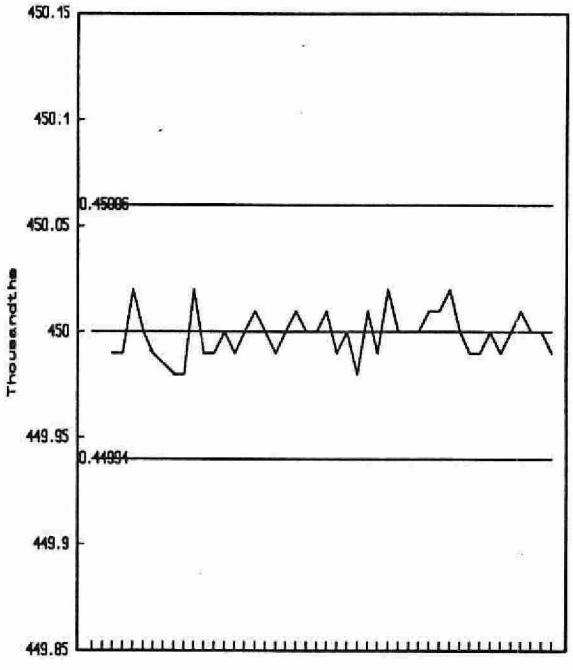
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank	51	-0.1369	0.1422

SOLIDS, IGNITED (mg/L)
(Particulate Ash)
QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SOLIDS, IGNITED ***
(Particulate Loss on Ignition)

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSPLOI	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: CALC07	Supervisor	: J. McBride
Method Reference No.	: E3194A		
Sample Type/Matrix	: Sewage, Industrial Waste, Effluents, Domestic Waters, Leachates		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The procedure for particulate solids (RSP) is followed and the dried residue is ignited at 600°C for one hour in a muffle furnace. As soon as practical, the dish is transferred to a desiccator to cool. The particulate loss on ignition (estimate of volatile suspended solids) is the difference between the final ignited mass plus filter and the RSP residue plus filter, divided by the original sample volume (mL) used for RSP. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), muffle furnace, ceramic dishes, Petri dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA
Drift	: Balance zero is checked at least every 20 dishes.

NOTES:

Tests on sewage samples were performed by a private laboratory, until Nov. 1992. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS, IGNITED
(Particulate Loss on Ignition)

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Solids Analytical Range: - to 3,000 mg/L

CALIBRATION CONTROL

	Number of Data	Expected Mass (g)	Av. Mass Measured	Standard(1) Deviation
A :	44	0.50	0.49999	0.000009
B :	44	0.05	0.04999	0.000009
A+B :	44	0.55	0.54998	0.000015
A-B :	44	0.45	0.44999	0.000011

s.d.(AB) S(between runs): 0.000009 Sw(within run): 0.000008 S/Sw: 1.2

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

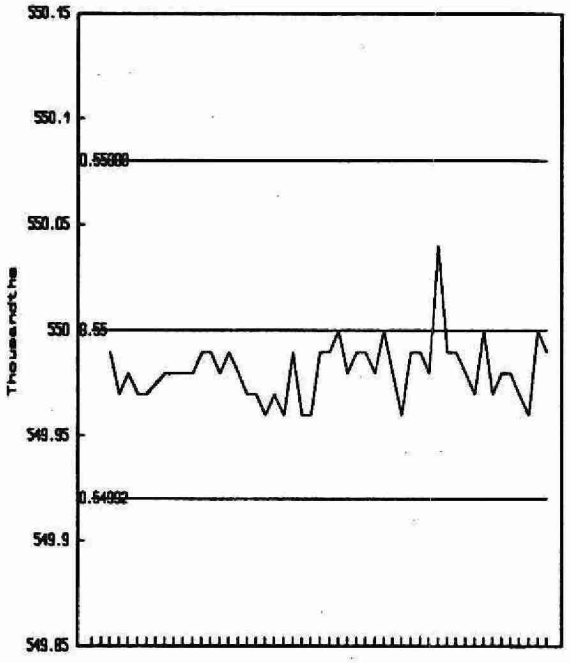
DUPLICATES:

Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
19	0.0	-	10.0	0.4504	10.2
46	10.0	-	50.0	1.1648	8.9
21	50.0	-	200.0	5.3033	18.7
5	200.0	-	600.0	49.2819	15.5
91	Overall			1.8692	

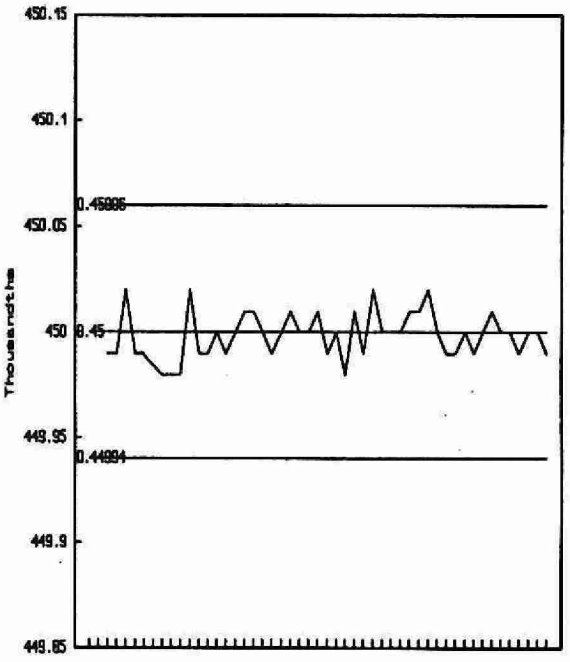
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Blank	46	0.3961	0.1439

SOLIDS, IGNITED (mg/L)
(Particulate Loss on Ignition)
QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

_____ CONTROL LIMIT

*** SOLIDS, PARTICULATE ***

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RSP	Units	: mg/L
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 206AB5	Supervisor	: J.McBride
Method Reference No.	: E3190A		
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents and Surface Waters		

SAMPLING:

Quantity Required	: 5-500 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

An appropriate shaken sample volume (5 to 500 mL) is pipetted or quickly poured into a graduated cylinder, and the volume is measured. The aliquot is then filtered under moderate suction through a preweighed Whatman 934AH glass fibre filter. The graduated cylinder and then the filter are washed with a total of 30 mL distilled water. The filter is dried at 103-105^{0}C, and suspended solids content is calculated by subtracting the original filter mass from the dried filter mass. Data collection, calculations, and transfer of results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5-decimal places), drying oven, suction filtration apparatus
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	:2 S class weights, e.g. QCA for each balance (results in grams)
Recovery	:LTBL plus 2 standards, e.g. R1
Drift	:Balance zero is checked every tenth weighing.
Blank	:Filter washed with 500 mL distilled water;

NOTES:

A standard correction factor was applied to all filters to account for weight loss during filtering (-0.0003g). QC data were obtained from two balances. Tests on sewage samples were performed by a private laboratory until Nov. 1992. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS, PARTICULATE

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Solids Analytical Range: - to 3000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured	Av. Bias	Standard(1) Deviation
A :	280	0.50	0.499991	-0.000009	0.000010
B :	280	0.05	0.049991	-0.000009	0.000011
A+B :	280	0.55	0.549981	-0.000019	0.000017
A-B :	280	0.45	0.450000	-0.000000	0.000011

s.d.(AB) S(between runs): 0.000010 Sw(within run): 0.000008 S/Sw: 1.3

On any given day the calibration is accepted if the values obtained lie within the ranges:

0.54992 - 0.55008 for A+B
0.44994 - 0.45006 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured	Standard(1) Deviation
R1 :	282	200.0	193.5	20.2
R2 :	282	50.0	49.0	6.8

DUPLICATES:

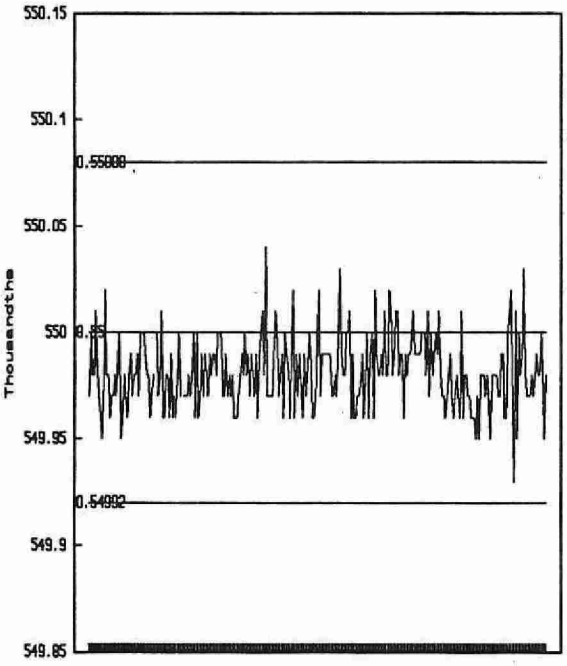
Number of Data Pairs	Sample Concn Span (mg/L)			Mean(2) s.d.	Coefficient of var.(%)
13	0.0	-	10.0	0.4180	9.5
53	10.0	-	25.0	1.2924	7.9
208	25.0	-	100.0	2.4953	5.1
168	100.0	-	500.0	7.7973	6.4
61	500.0	-	3000.0	45.8165	8.5
503	Overall			4.9887	

OTHER CHECKS:

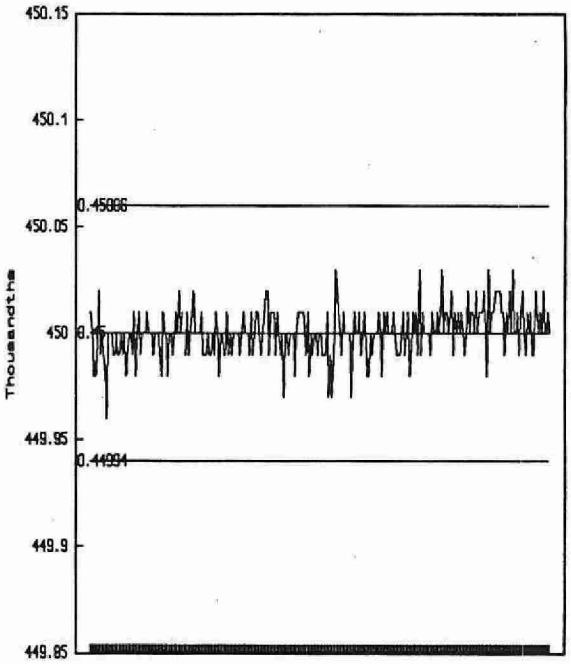
	Number of Data	Data Mean	Standard(1) Deviation
Blank	279	0.2115	0.1802

SOLIDS, PARTICULATE (mg/L)

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SOLIDS, TOTAL ***

IDENTIFICATION:

Laboratory	: Solids	Method Introduced	: Before '81
LIS Test Name Code	: RST	Units	: mg/L or mg/Kg
Work Station Code	: SOLIDS	Unit Code	: 064000
Method Code	: 506AB4	Supervisor	: J. McBride
Method Reference No.	: E3192A		
Sample Type/Matrix	: Sewage, Industrial Waste, Drinking Waters, Leachates, Effluents, Sludge		

SAMPLING:

Quantity Required	: 125 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

A 50.0 or 100 mL aliquot of sample is pipetted into a preweighed Teflon dish, dried at 103-105°C, and stored in a desiccator for at least 24 hours. After reweighing, the total residue or solids content is calculated by subtracting the original dish mass. Data collection, calculations, and transfer or results to LIS are controlled by a microcomputer system.

INSTRUMENTATION:

Balance (4/5 decimal places), drying oven, Teflon dishes
Microcomputer system with appropriate software

REPORTING:

Maximum Significant Figures: 3 Current W value: 2 T value: 10

CALIBRATION:

Balance zero
Internal calibration provided in the balance

CONTROLS:

Calibration	: 2 S class weights, e.g. QCA (results in grams)
Recovery	: BL plus 2 standards, e.g. R1
Drift	: Balance zero is checked every tenth weighing

NOTES:

Correction factor for dish tare weights, based on variation of a standard sealed vessel, was included in the calculation. QC data were obtained from two balances that are used for all solids analyses. The calibration control data are the same used for Dissolved Solids. Tests on sewage samples were performed by a private laboratory until,Nov. 1992. QC results reported here represent only tests performed at the Central Laboratory.

SOLIDS, TOTAL

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Solids Analytical Range: 2 to 60000 mg/L

CALIBRATION CONTROL:

	Number of Data	Expected Mass (g)	Av. Mass Measured	Av. Bias	Standard(1) Deviation
A :	59	50.00	49.99998	0.00002	0.00010
B :	59	30.00	29.99983	-0.00017	0.00006
A+B :	59	80.00	79.99982	-0.00018	0.00015
A-B :	59	20.00	20.00015	0.00015	0.00008

s.d.(AB) S(between runs): 0.000084 Sw(within run): 0.000053 S/Sw: 1.6

On any given day the calibration is accepted if the values obtained lie within the ranges:

79.99900 - 80.00100 for A+B
19.99925 - 20.00075 for A-B

RECOVERIES:

	Number of Data	Expected Concn (mg/L)	Av. Concn Measured	Standard(1) Deviation
R1 :	57	20000.0	20034.7	76.8
R2 :	55	2000.0	1997.8	11.0

DUPLICATES:

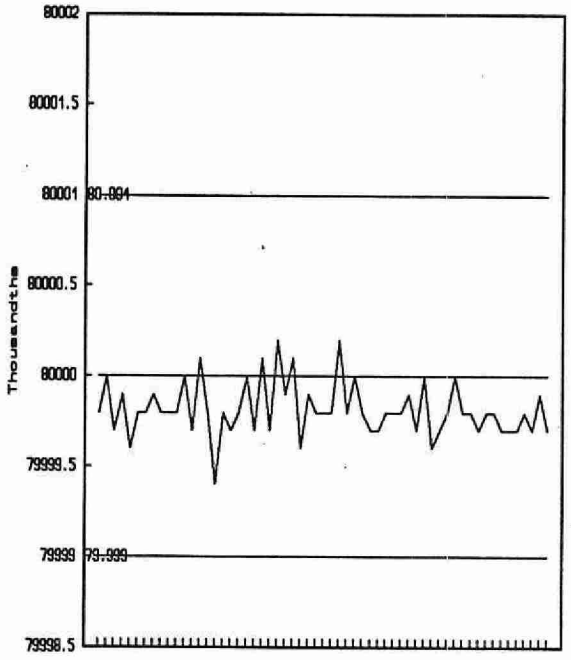
Number of Data Pairs	Sample Concn Span (mg/L)			Mean(2) s.d.	Coefficient of var.(%)
44	0.0	-	100.0	2.5923	4.5
50	100.0	-	500.0	4.0359	3.2
5	500.0	-	2000.0	23.0527	2.4
0	2000.0	-	60000.0	N.A.	N.A.
99		Overall		3.5776	

OTHER CHECKS:

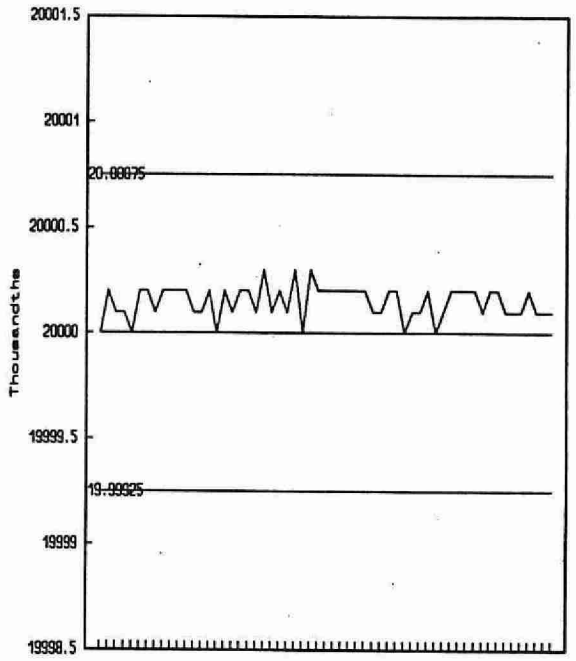
	Number of Data	Data Mean	Standard(1) Deviation
Blank	57	0.2693	3.9620

SOLIDS, TOTAL (mg/L or mg/Kg)

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO_4
Work Station Code	: PRIC1	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3147A		
Sample Type/Matrix	: Precipitation, Throughfall, Stemflow		

SAMPLING:

Quantity Required	: 15 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO_4 is determined by the comparison of the sample peak heights to a series of standards.
Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing, and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus 7 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Two analytical ranges are in operation at this work station, and subsequently, quality control results are provided for each range.

SULPHATE

QUALITY CONTROL DATA FROM 16/01/92 TO 21/12/92

Lab: Ion Chromatography Analytical Range: - to 5.0 mg/L as SO_4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	34	4.0	3.999	-0.001	0.0475
B :	34	1.0	0.999	-0.001	0.0274
A+B :	34	5.0	4.998	-0.002	0.0582
A-B :	34	3.0	2.9998	-0.0002	0.0511

s.d.(AB) S(between runs): 0.039 Sw(within run): 0.036 S/Sw: 1.07

On any given day the calibration is accepted if the values obtained lie within the ranges:

4.79	-	5.21	for	A+B
2.84	-	3.16	for	A-B

DUPLICATES:

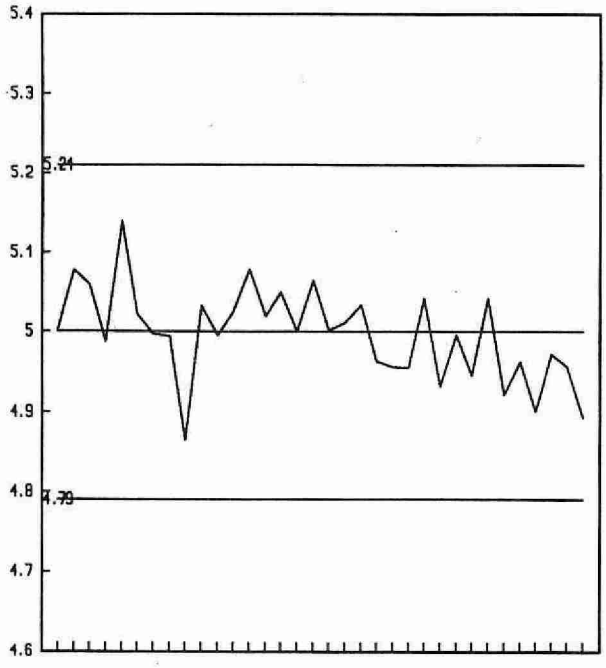
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
13	0.0	-	0.5	0.015	29.7
37	0.5	-	2.0	0.027	3.3
44	2.0	-	5.0	0.037	1.3
94	Overall			0.029	

OTHER CHECKS:

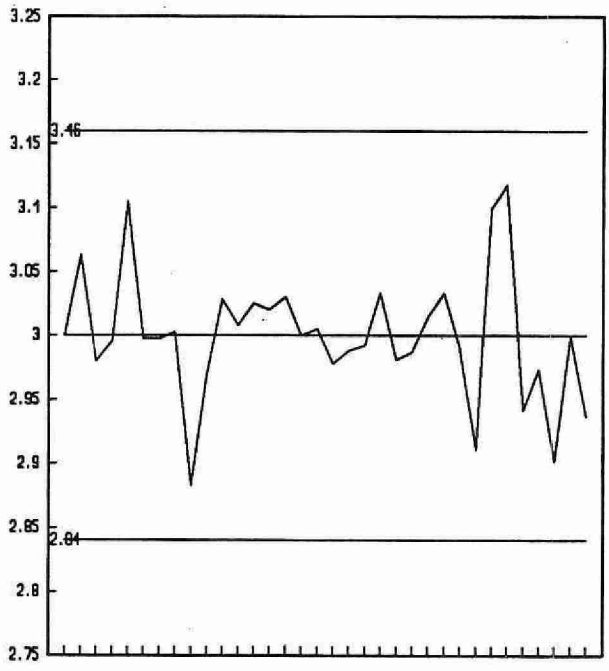
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	34	0.005	0.023

SULPHATE (mg/L as SO_4)

QUALITY CONTROL DATA FROM 16/01/92 TO 21/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

SULPHATE

QUALITY CONTROL DATA FROM 06/01/92 TO 24/12/92

Lab: Ion Chromatography Analytical Range: - to 10.0 mg/L as SO_4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	70	8.0	8.006	0.006	0.0779
B :	70	2.0	2.002	0.002	0.0425
A+B :	70	10.0	10.007	0.007	0.0872
A-B :	70	6.0	6.004	0.004	0.0902

s.d.(AB) S(between runs): 0.063 Sw(within run): 0.0464 S/Sw: 0.98

On any given day the calibration is accepted if the values obtained lie within the ranges:

9.47	-	10.53	for	A+B
5.6	-	6.4	for	A-B

DUPLICATES:

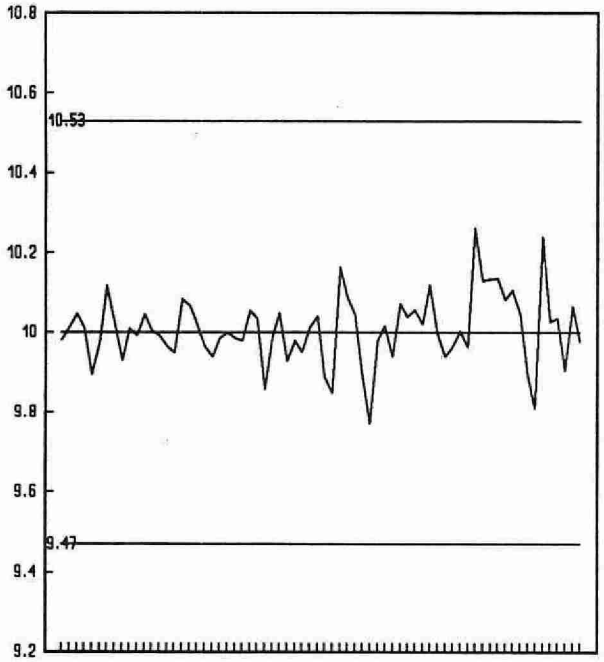
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
13	0.0	-	1.0	0.019	9.3
26	1.0	-	5.0	0.057	2.3
132	5.0	-	10.0	0.117	1.5
171	Overall			0.104	

OTHER CHECKS:

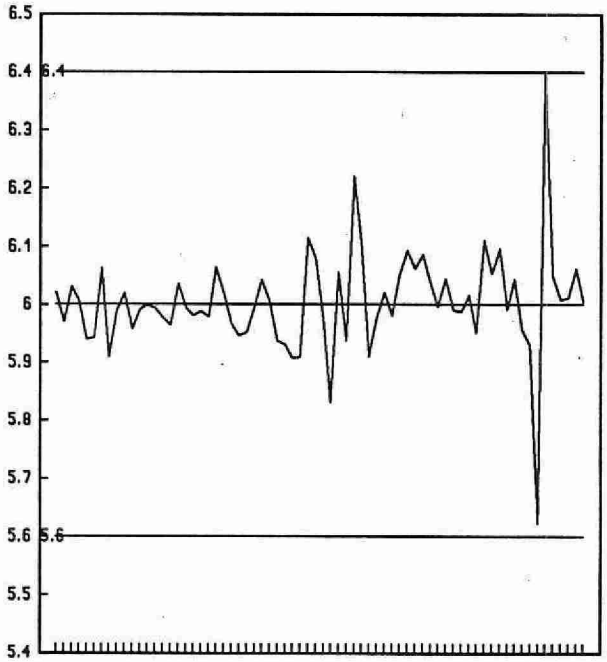
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	70	0.0203	0.044

SULPHATE (mg/L as SO_4)

QUALITY CONTROL DATA FROM 06/01/92 TO 24/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/78
LIS Test Name Code	: SSO4UR	Units	: µg/Filter as SO_4
Work Station Code	: PRLOV	Unit Code	: 361941
Method Code	: 004AIC	Supervisor	: F. Lo
Method Reference No.	: E3150A		
Sample Type/Matrix	: W40 filters from LoVol filter packs		

SAMPLING:

Quantity Required : 1 filter
Container : 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of DDW in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO_4 is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as SO_4.
Chloride and nitrogen-nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration : LTBL plus 2 standards, e.g. QCA
Drift : 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 500 µg/filter as SO_4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	60	400	399.7	-0.3	3.247
B :	60	100	101.1	1.1	1.872
A+B :	60	500	500.8	0.8	4.229
A-B :	60	300	298.6	-1.4	3.194

s.d.(AB) S(between runs): 2.65 Sw(within run): 2.26 S/Sw: 1.17

On any given day the calibration is accepted if the values obtained lie within the ranges:

484	-	516	for	A+B
288	-	312	for	A-B

DUPLICATES:

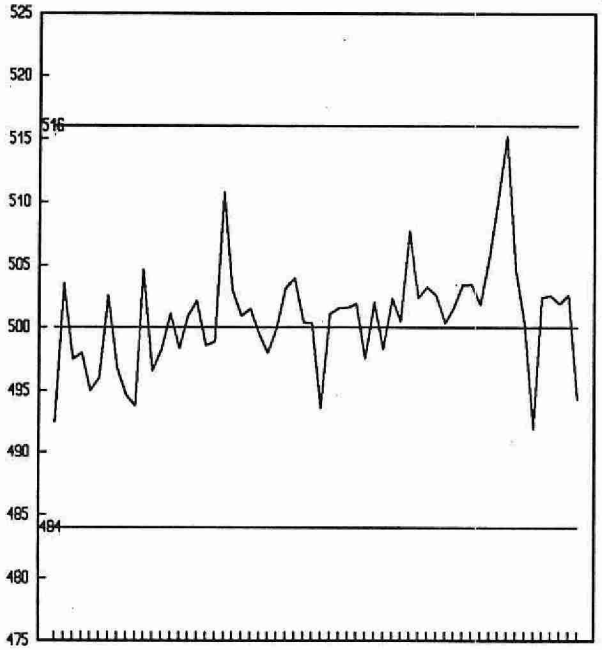
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
11	0	-	100	1.10	4.1
31	100	-	250	1.44	1.0
10	250	-	500	1.21	0.4
52		Overall		1.37	

OTHER CHECKS:

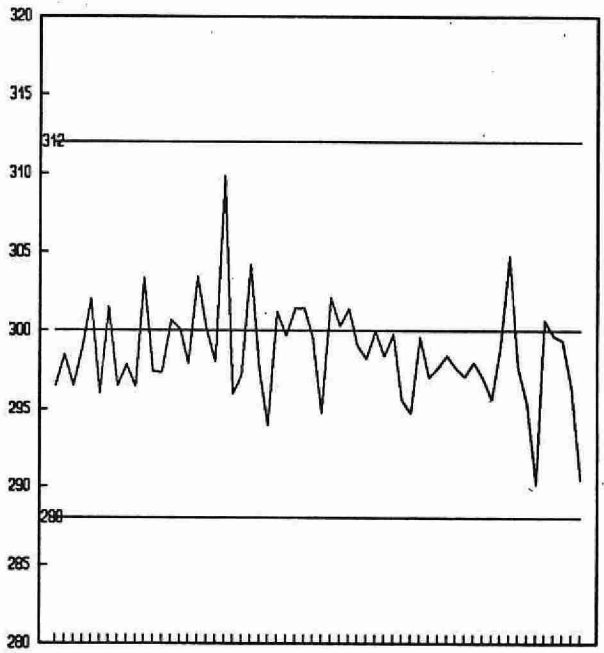
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	60	0.043	0.323

SULPHATE (µg/filter as SO_4)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A−B

———— CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO4FR,SSO4NF	Units	: µg/Filter as SO_4
Work Station Code	: PRSEQ	Unit Code	: 361941
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: Nylon (SSO4NF) filters from LoVol and sequential filter packs, and Teflon (SSO4FR) filters from sequential filter packs.		

SAMPLING:

Quantity Required	: 1 filter
Container	: 50 mL polypropylene tube

SAMPLE PREPARATION:

Filters are extracted with 25.0 mL of DDW (Teflon) or 25.0 mL of 0.03 N NaOH (nylon) in polypropylene tubes with ultrasonic treatment followed by a 24 hour rest period.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the sample by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO_4 is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter as SO_4.
Chloride and Nitrogen-Nitrate are determined simultaneously.

INSTRUMENTATION:

Ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one filter because duplicate filters are not received.

SULPHATE
(SSO4FR)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 250 µg/filter as SO_4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	60	200	199.55	-0.45	1.266
B :	60	50	50.31	0.31	0.779
A+B :	60	250	249.86	-0.14	1.536
A-B :	60	150	149.24	-0.76	1.435

s.d.(AB) S(between runs): 1.05 Sw(within run): 1.01 S/Sw: 1.04

On any given day the calibration is accepted if the values obtained lie within the ranges:

241	-	259	for	A+B
144	-	156	for	A-B

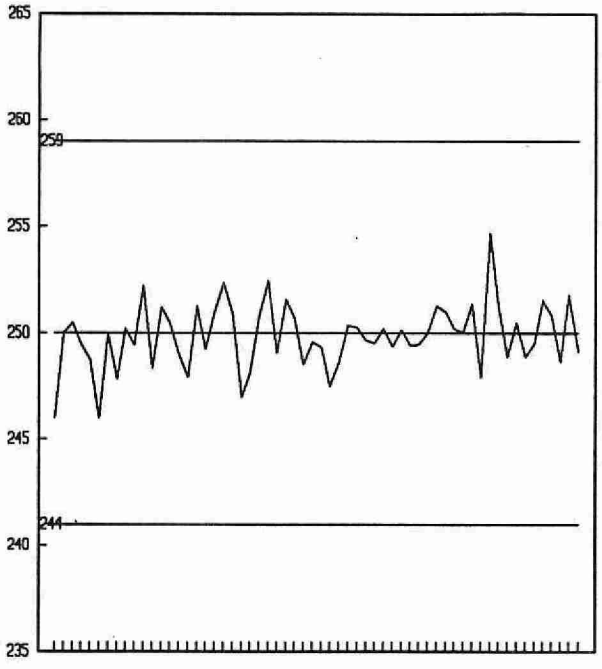
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
34	0.0 - 25.0	0.192	168.2
32	25.0 - 100.0	0.400	128.1
10	100.0 - 250.0	0.398	142.2
76	Overall	0.325	

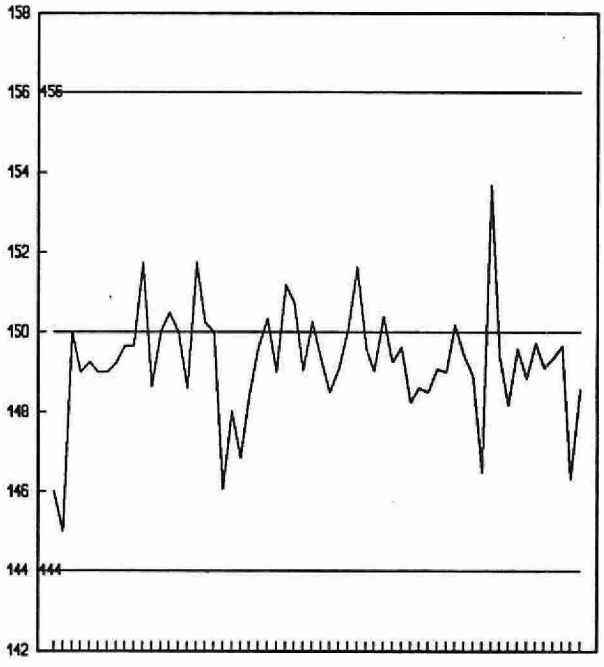
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	60	0.0	0.0

SULPHATE (µg/filter as SO_4)
(SSO4FR)
QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

SULPHATE
(SSO4NF)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 250 µg/filter as SO_4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	61	200.0	199.51	-0.49	1.249
B :	61	50.0	50.33	0.33	0.783
A+B :	61	250.0	249.85	-0.15	1.523
A-B :	61	150.0	149.18	-0.82	1.423

s.d.(AB) S(between runs): 1.04 Sw(within run): 1.01 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

241	- 259	for	A+B
144	- 156	for	A-B

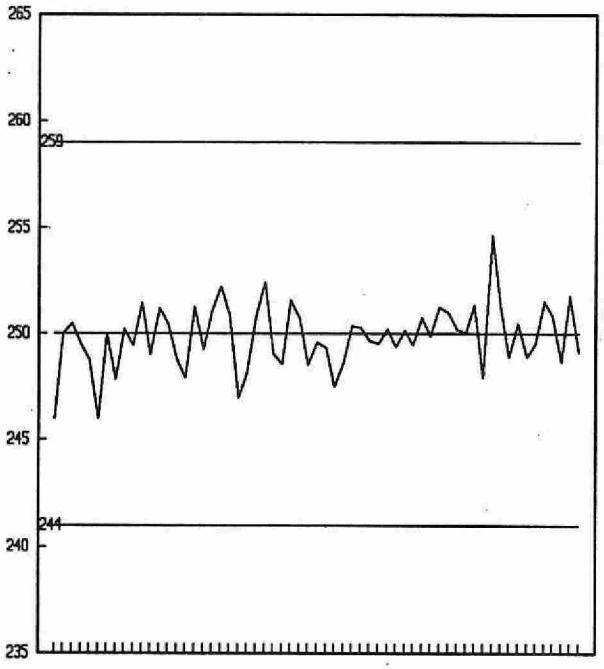
DUPLICATES:

Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
62	0 - 25	0.270	3.6
23	25 - 100	0.637	2.2
14	100 - 150	0.697	1.0
0	150 - 250	N.A.	N.A.
99	Overall	0.389	

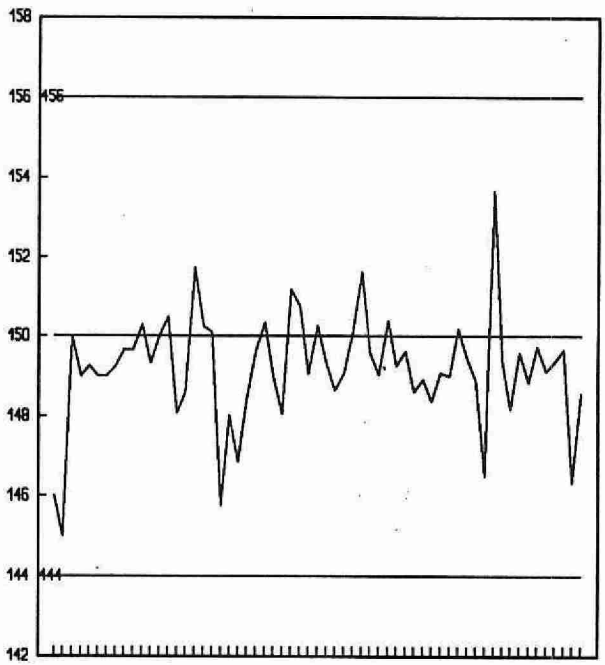
OTHER CHECKS:

	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	61	0.00	0.0

SULPHATE (µg/filter as SO_4)
(SSO4NF)
QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** SULPHATE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/04/82
LIS Test Name Code	: SSO4UR	Units	: mg/L as SO_4
Work Station Code	: RMDSO4	Unit Code	: 064941
Method Code	: 003AI0	Supervisor	: F. Lo
Method Reference No.	: E3172A		
Sample Type/Matrix	: Rivers, Lakes, Domestic Waters, Leachates, Soil Extracts, Effluents		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic bottle

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the samples by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. The concentration of sulphate in mg/L as SO_4 is determined by comparison of the sample scan to a series of standard scans.

INSTRUMENTATION:

Basic modular continuous flow ion chromatographic system plus control module (in-house design) for automated sample introduction and timing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.5 T value: 2.5

CALIBRATION:

BL plus 10 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

SULPHATE

QUALITY CONTROL DATA FROM 08/01/92 TO 24/12/92

Lab: Ion Chromatography Analytical Range: - to 100.0 mg/L as SO_4

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	110	80.0	80.057	0.057	0.6355
B :	110	20.0	19.849	-0.151	0.5429
A+B :	110	100.0	99.907	-0.093	0.9249
A-B :	110	60.0	60.208	0.208	0.7360

s.d.(AB) S(between runs): 0.59 Sw(within run): 0.52 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

97.2	-	102.8	for	A+B
57.9	-	62.1	for	A-B

DUPLICATES:

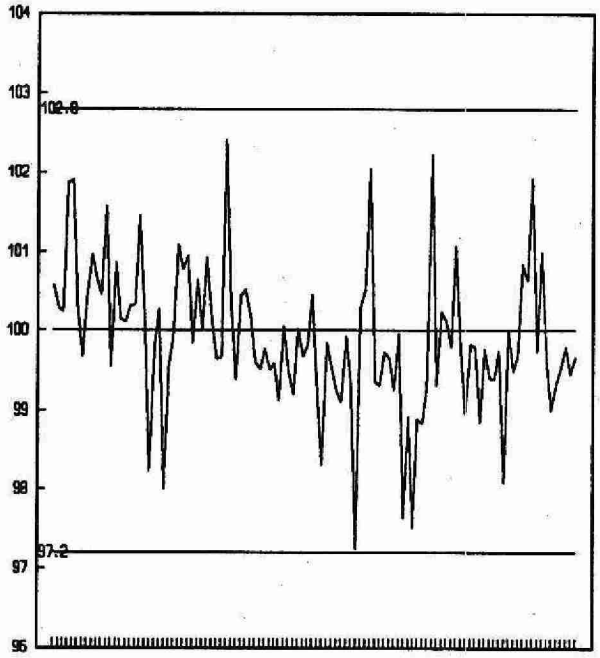
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
104	0.0	-	20.0	0.188	2.2
109	20.0	-	50.0	0.467	1.4
46	50.0	-	100.0	0.702	0.9
259	Overall			0.392	

OTHER CHECKS:

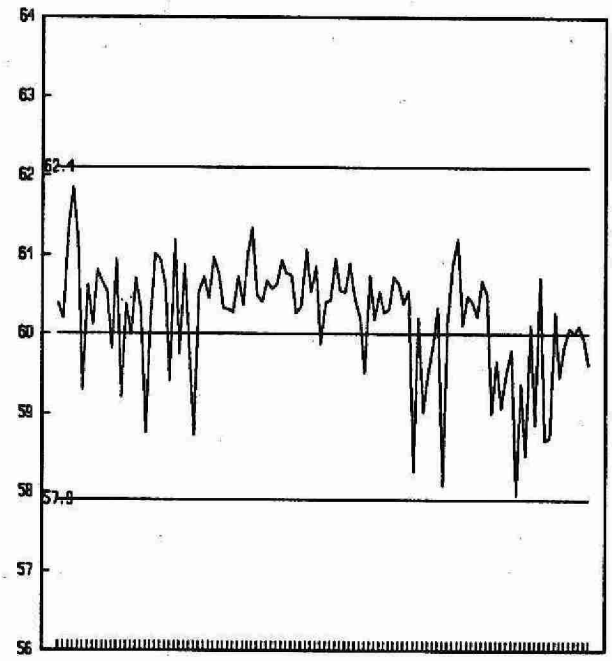
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	110	0.0.058	0.149

SULPHATE (mg/L as SO4)

QUALITY CONTROL DATA FROM 08/01/92 TO 24/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

———— CONTROL LIMIT

*** SULPHUR DIOXIDE ***

IDENTIFICATION:

Laboratory	: Ion Chromatography	Method Introduced	: 01/07/80
LIS Test Name Code	: SSO2FR	Units	: µg/Filter set as SO_2
Work Station Code	: PRSEQ	Unit Code	: 361943
Method Code	: 004AI0	Supervisor	: F. Lo
Method Reference No.	: E3148A		
Sample Type/Matrix	: W41 filters from LoVol and sequential filter packs.		

SAMPLING:

Quantity Required	: 1 set of 2 filters
Container	: 50 mL polypropylene tube
Other	: Filter is impregnated with potassium carbonate/glycerol solution.

SAMPLE PREPARATION:

Filters are extracted with 50.0 mL of 0.05% H_2O_2 in polypropylene tubes with one hour of mechanical shaking, followed by ultrasonic treatment to enhance extraction, then a 24 hour rest period. SO_2 is converted to SO_4 in the process.

ANALYTICAL PROCEDURE:

Sulphate is separated from other anions in the extract by automated suppressed ion chromatography using an eluent mixture of 0.003 M sodium bicarbonate and 0.0024 M sodium carbonate with conductivity detection. Samples are spiked with $Na_2CO_3/NaHCO_3$ to match the eluent strength and maintain background conductivity. The concentration of sulphate in mg/L as SO_4 is determined by the comparison of the sample peak heights to a series of standards. Results are converted to µg/filter set as SO_2.
Chloride and Nitrogen-Nitrate are determined simultaneously.

INSTRUMENTATION:

Mechanical shaker; ultrasonic bath; modular continuous flow ion chromatographic system plus microcomputer for automated sample injection, timing and partial data processing.

REPORTING:

Maximum Significant Figures: 3 Current W value: 1.0 T value: 5.0

CALIBRATION:

BL plus 9 standards

CONTROLS:

Calibration	: LTBL plus 2 standards, e.g. QCA
Drift	: 1 standard every 10 samples

NOTES:

Detection criterion is based on duplicate analyses of the extract from one set of filters because duplicate filter sets are not received.

SULPHUR DIOXIDE

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92

Lab: Ion Chromatography Analytical Range: - to 350 µg/filter as SO_2

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	61	266.0	265.71	-0.29	1.75
B :	61	67.0	67.04	0.04	1.01
A+B :	61	333.0	332.75	-0.25	1.95
A-B :	61	200.0	198.68	-1.32	2.09

s.d.(AB) S(between runs): 1.43 Sw(within run): 1.48 S/Sw: 0.96

On any given day the calibration is accepted if the values obtained lie within the ranges:

321	-	345	for	A+B
191	-	209	for	A-B

DUPLICATES:

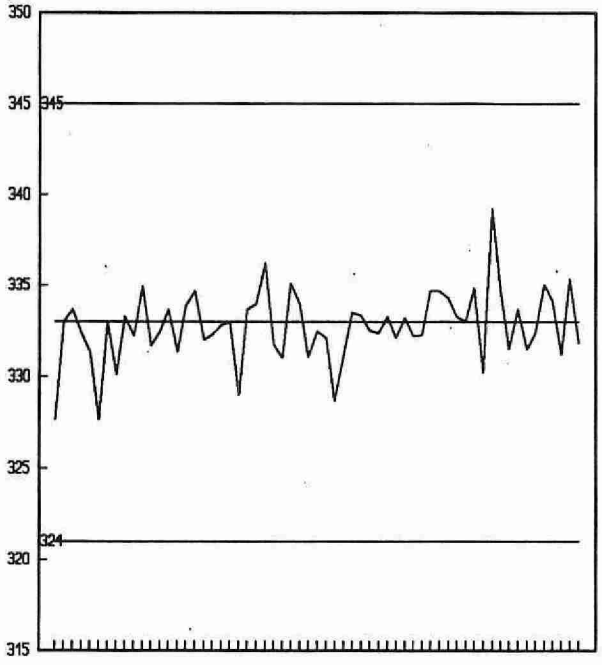
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
50	0	-	35	0.487	10.5
12	35	-	70	0.769	7.1
21	70	-	175	2.078	2.5
12	175	-	350	3.051	1.1
95	Overall			0.936	

OTHER CHECKS:

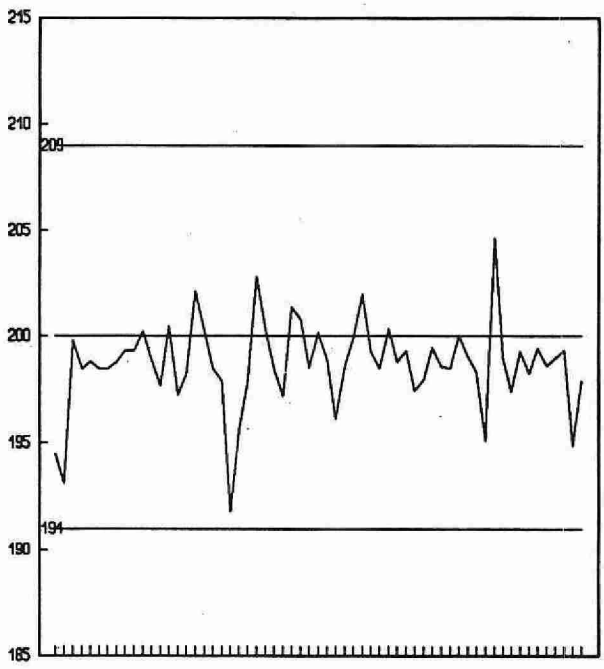
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	61	0.0	0.0

SULPHUR DIOXIDE (µg/filter as SO_2)

QUALITY CONTROL DATA FROM 09/01/92 TO 03/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

*** TURBIDITY ***

IDENTIFICATION:

Laboratory	: Colourimetry		
	: Ion Chromatography	Method Introduced	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: RMTURB		
	: WTURB	Unit Code	: 343000
Method Code	: 002AI1	Supervisor	: M. Rawlings
Method Reference No.	: E3231A		
Sample Type/Matrix	: Rivers, Lakes, Effluents		
	: Drinking Water, Industrial, Sewage		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio 18900 Turbidimeter

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.05 T value: 0.25

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration : BL plus two standards, e.g. QCA

NOTES:

Two work stations are used for turbidity analyses: RMTURB and WTURB. Each used a different set of standards for calibration control. Laboratory, Work Station Code, Sample Type/Matrix, are given in their respective orders.

The constant drift readily noticeable in the calibration control standards is due to slow degeneration of the semi-solid matrix (Gelex) standards themselves. However, there is no better long term calibration material available. Periodic checks against freshly prepared Formazin standard is used to confirm the drift.

RMTURB work station ended in Dec. 92 and was replaced by a robotic operation (ROBOTURB) for turbidimetric measurements.

TURBIDITY

QUALITY CONTROL DATA FROM 16/01/92 TO 11/12/92

Lab: Colourimetry Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	185	16.4	16.44	0.04	0.1467
B :	185	1.9	1.93	0.07	0.0179
A+B :	185	18.3	18.38	0.08	0.1548
A-B :	185	14.5	14.52	0.02	0.1405

s.d.(AB) S(between runs): 0.10 Sw(within run): 0.099 S/Sw: 1.1

On any given day the calibration is accepted if the values obtained lie within the ranges:

17.98 - 18.62 for A+B
14.26 - 14.74 for A-B

DUPLICATES:

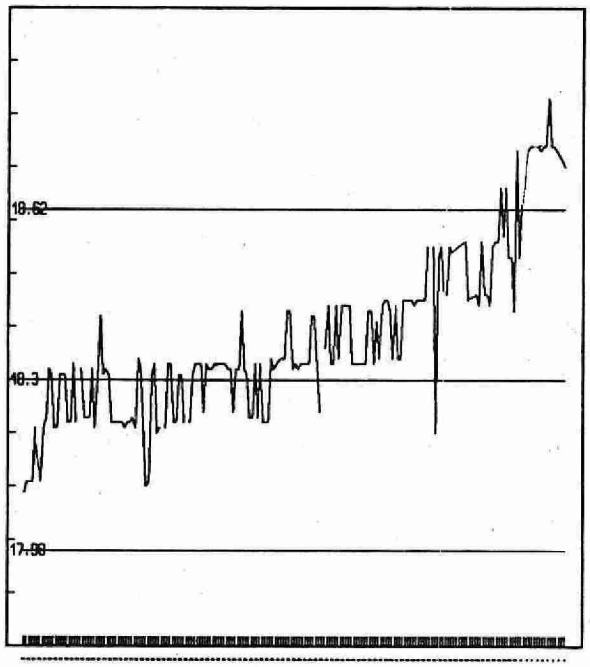
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
63	0.0	-	1.0	0.0389	8.6
128	1.0	-	2.0	0.1100	9.1
298	2.0	-	10.0	0.2696	9.7
129	10.0	-	50.0	0.8602	4.4
25	50.0	-	200.0	1.3362	1.6
643		Overall		0.3022	

OTHER CHECKS:

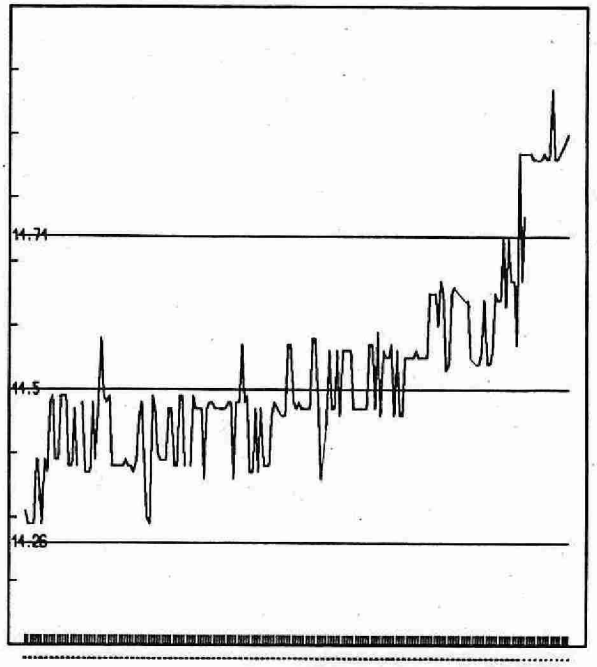
	Number of Data	Data Mean	Standard(1) Deviation
Long Term Blank	186	0.0579	0.0136

TURBIDITY (FTU)

QUALITY CONTROL DATA FROM 16/01/92 TO 11/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

CONTROL LIMIT

TURBIDITY

QUALITY CONTROL DATA FROM 02/01/92 TO 09/12/92

Lab: Titration Analytical Range: - to 200 FTU

CALIBRATION CONTROL:

	Number of Data	Expected Concn	Av. Concn Measured	Av. Bias	Standard(1) Deviation
A :	197	18.26	18.74	0.48	0.2622
B :	197	1.8	1.68	-0.12	0.0754
A+B :	197	19.8	20.42	0.62	0.2602
A-B :	197	16.2	17.06	0.86	0.2849

s.d.(AB) S(between runs): 0.19 Sw(within run): 0.20 S/Sw: 0.96

On any given day the calibration is accepted if the values obtained lie within the ranges:

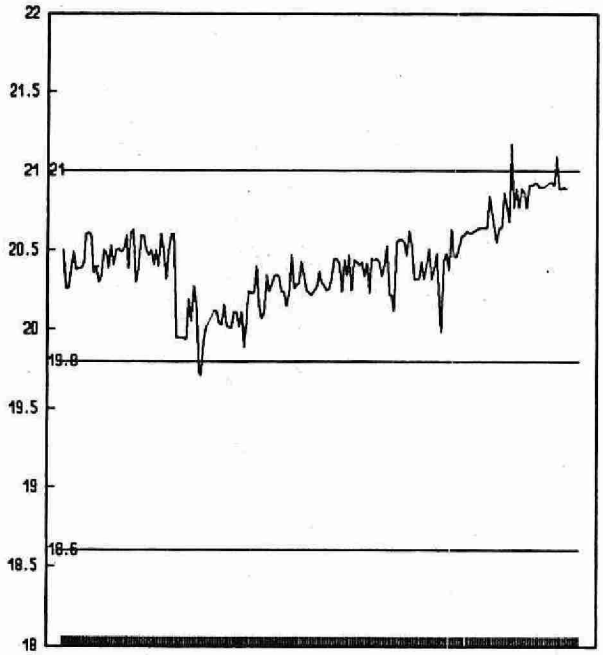
18.6	-	21.0	for	A+B
15.4	-	17.0	for	A-B

DUPLICATES:

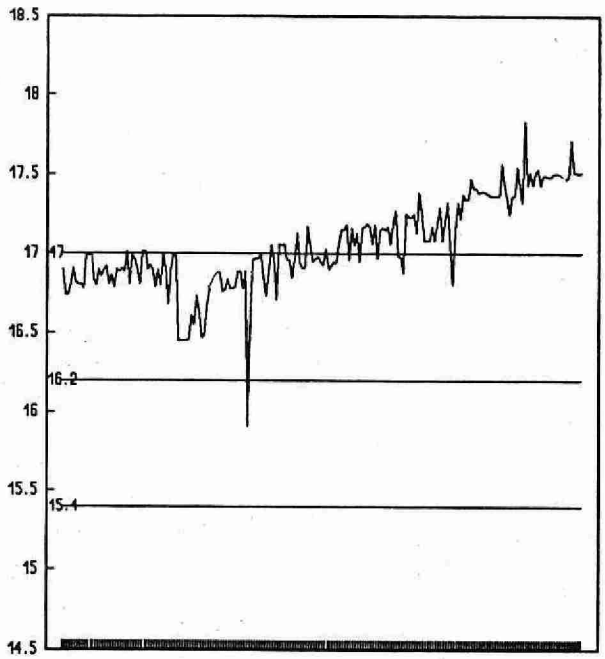
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
289	0.0	-	1.0	0.0318	7.1
77	1.0	-	2.0	0.0636	5.0
96	2.0	-	10.0	0.1665	4.9
35	10.0	-	50.0	0.6059	4.1
12	50.0	-	200.0	1.2380	1.8
509	Overall			0.0699	

TURBIDITY (FTU)

QUALITY CONTROL DATA FROM 02/01/92 TO 09/12/92



QUALITY CONTROL STANDARD A+B



QUALITY CONTROL STANDARD A-B

———— CONTROL LIMIT

*** TURBIDITY ***

IDENTIFICATION:

Laboratory	: Colourimetry		
	: Ion Chromatography	Method Introduced	: Before '74
LIS Test Name Code	: TURB	Units	: FTU
Work Station Code	: ROBOTURB		
		Unit Code	: 343000
Method Code	: 002AI2	Supervisor	: M. Rawlings
Method Reference No.	: E3311A		
Sample Type/Matrix	: Rivers, Lakes, Effluents		
	: Drinking Water, Industrial, Sewage		

SAMPLING:

Quantity Required	: 50 mL
Container	: Glass or plastic

ANALYTICAL PROCEDURE:

The instrument is standardized with sealed standards which are prepared commercially and rated in Formazin Turbidity Units. Samples are placed in the turbidimeter, and results in FTU are read directly from the digital output. Turbidity measurement are based on light scattering at 90 plus or minus 30 degrees of rotation. The instrument compensates for sample colour.

INSTRUMENTATION:

-Hach Ratio/XR Model Turbidimeter modified to accept control signals from robot controller, electronic interphase, Zymark ZYMATE 11 Laboratory Robot System, IBM PC computer.

REPORTING:

Maximum Significant Figures: 3 Current W value: 0.01 T value: 0.05

CALIBRATION:

BL plus formazin standards (at least once annually)

CONTROLS:

Calibration	: five standards, e.g. QCA

TURBIDITY

QUALITY CONTROL DATA FROM 03/11/92 TO 23/12/92

Lab: Colourimetry Analytical Range: - to 2000 FTU

CALIBRATION CONTROL:

	Number of Data	Standard Range	Av. Concn Measured	Standard(1) Deviation
A :	26	2.0	1.402	0.0335
B :	26	20.0	17.49	0.1258
C :	26	200.0	185.92	1.6911
D :	26	2000.0	1609.87	9.5361

s.d.(AB) S(between runs): 0.29 Sw(within run): 0.28 S/Sw: 1.03

On any given day the calibration is accepted if the values obtained lie within the ranges:

1.3	- 1.5	for	A
17.1	- 17.9	for	B
181	- 191	for	C
1578	- 1638	for	D

DUPLICATES:

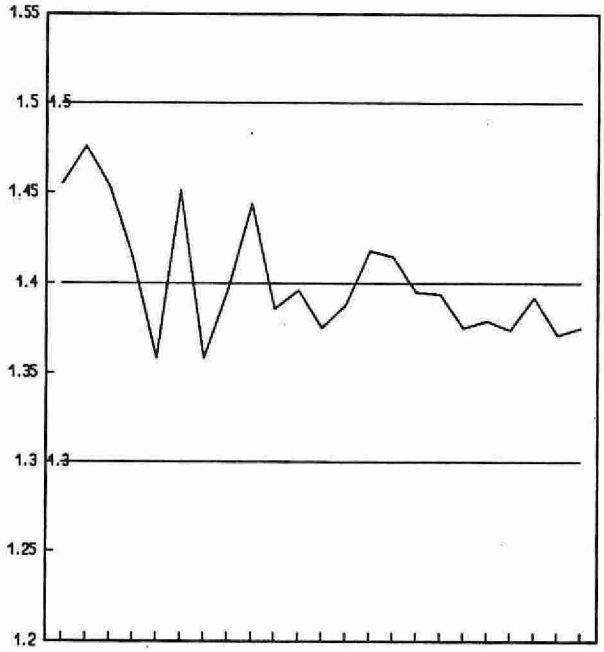
Number of Data Pairs	Sample Concn Span			Mean(2) s.d.	Coefficient of var.(%)
53	0.0	-	2.0	0.0777	18.4
48	2.0	-	20.0	0.4509	9.4
10	20.0	-	100.0	1.3850	5.1
3	100.0	-	200.0	3.8469	0.6
114	Overall			0.2947	

OTHER CHECKS:

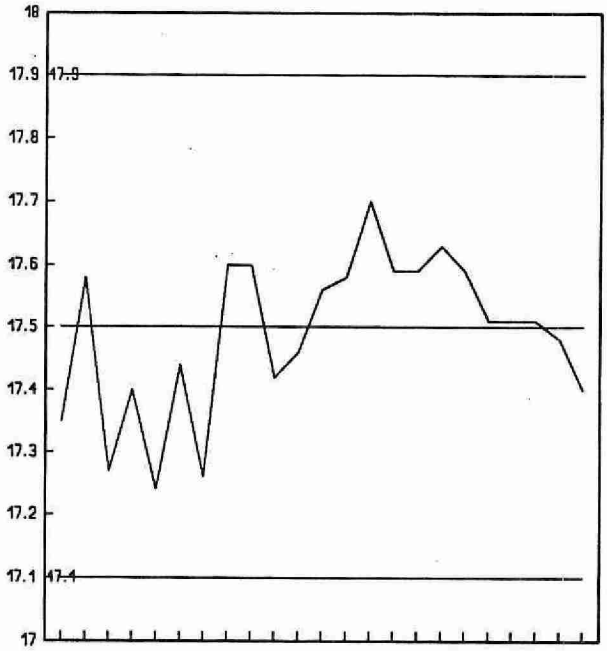
	Number of Data	Data Mean	Standard(1) Deviation
Stray Light	26	0.0582	0.0052

TURBIDITY (FTU)

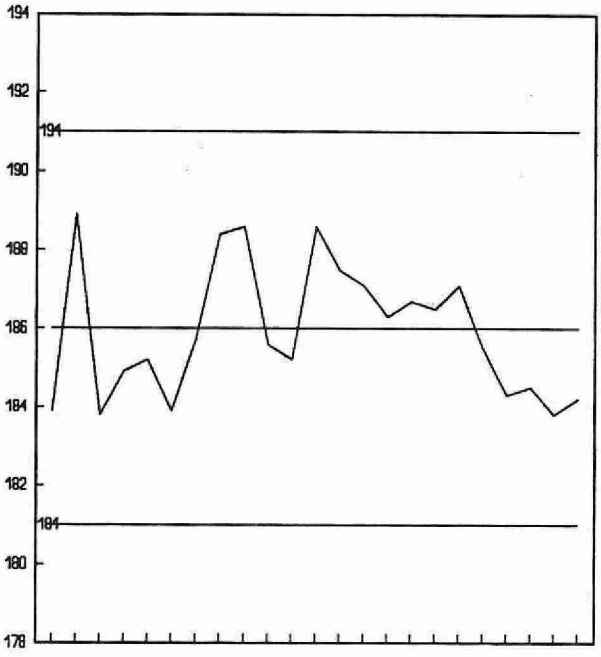
QUALITY CONTROL DATA FROM 03/11/92 TO 23/12/92



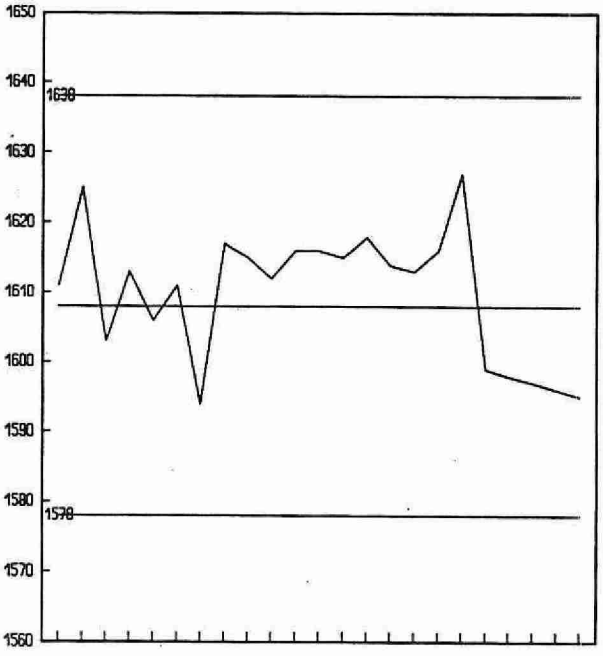
QUALITY CONTROL STANDARD A



QUALITY CONTROL STANDARD B



QUALITY CONTROL STANDARD C



QUALITY CONTROL STANDARD C

CONTROL LIMIT

*** ZINC, TOTAL ***

IDENTIFICATION:

Laboratory	: Dorset	Method Introduced	: 1991
LIS Test Name Code	: ZINC	Units	: µg/L
Work Station Code	: DOTRACE	Unit Code	: 063830
Method Code	: 005AF2	Supervisor	: J. McBride
Method Reference No.	: E3304A		
Sample Type/Matrix	: Surface waters, precipitation		

SAMPLING:

Quantity Required : 5mL
Container : glass or plastic, capped, acidified to 0.25% with $HN0_3$

ANALYTICAL PROCEDURE:

Samples are analyzed by GFAAS at 213.9 nm.
Absorbance : 0.8 at full scale

INSTRUMENTATION:

Varian graphite furnace atomic absorption spectrometer with automated sampler.

REPORTING:

Maximum Significant Figures: 3 Calculated W value: 0.001 T value: 0.005

CALIBRATION:

Blank plus 5 calibration standards.

CONTROLS:

Calibration : 1 NRC solution, 3 duplicates
Drift : 1 standard every 10 samples

ZINC, TOTAL

QUALITY CONTROL DATA FROM 17/02/92 TO 23/12/92

Lab: Dorset Soils

Analytical Range:- to 20 µg/L as Zn

QUALITY CONTROL:

	Number of Data	Av. Concn Measured	Standard(1) Deviation
QCA :	11	2.471	0.0962
NRC :	34	3.233	0.0759

DUPLICATES:

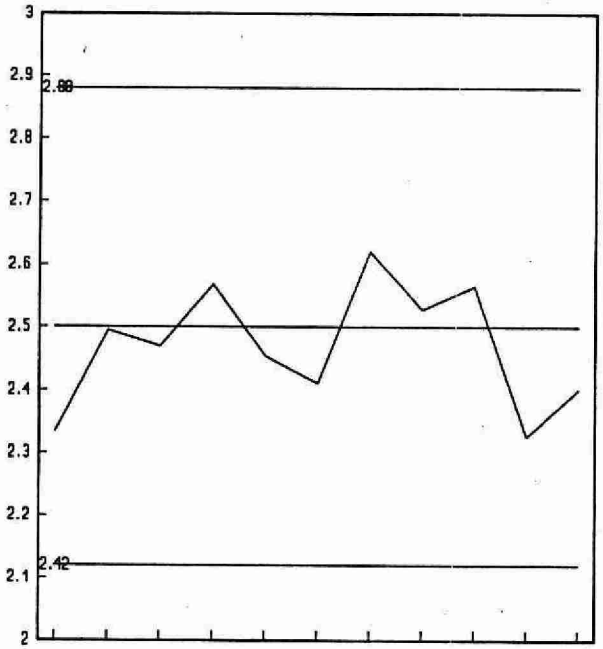
Number of Data Pairs	Sample Concn Span	Mean(2) s.d.	Coefficient of var.(%)
35	0.00 - 1.00	0.0205	35.3
41	1.00 - 10.00	0.2069	5.9
1	10.00 - 20.00	N.A.	N.A.
77	Overall	0.114	

NOTES:

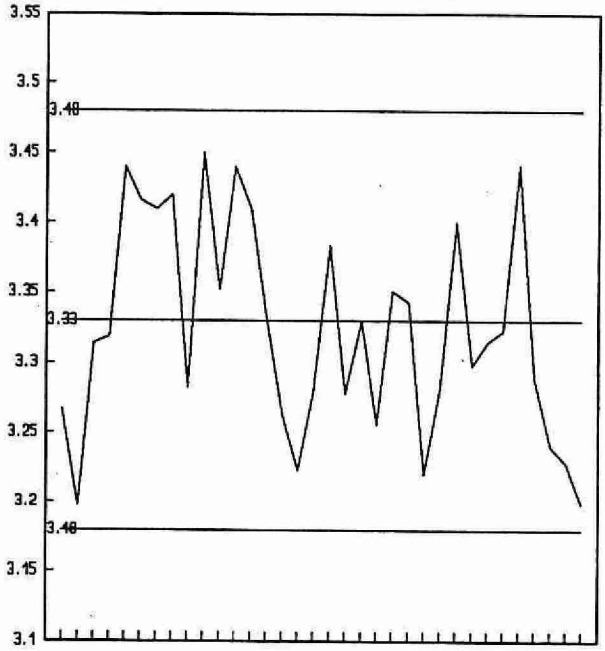
QCA is a low level calibration control standard prepared from an EPA ampoule.

ZINC, TOTAL (µg/L)

QUALITY CONTROL DATA FROM 17/02/92 TO 23/12/92



QUALITY CONTROL STANDARD A



NRC REFERENCE SAMPLE

_____CONTROL LIMIT

3.1 Quality Control Program , Microbiology

Sources of error in a microbiological lab often are attributed to lack of implementation of quality control procedures for media preparation and storage, equipment malfunction, inadequate cleansing or sterilization of glassware and impure water supplies. Detailed information regarding the quality control program for these issues are discussed in the LSB publications (8)(9). This report discusses only the quality control procedures that are related directly to sample analysis.

Analyses on microbiological samples for bacteria indicative of pollution require the careful use of methods and techniques by technicians to prevent contamination which will produce either false positive or false negative results. Checks are made to ensure that the analytical procedures are functioning properly and providing the client with results that are both accurate and reproducible within the limits of normal statistical variation. To this end, a series of quality control tests are conducted on a regular basis and their results are monitored so that any irregularities in the test procedures are corrected and false results are not reported.

Membrane Filtration Test (MF)

Blank Control Filters

Each sample analyzed by the membrane filter test is separated from the previous sample by introducing a control filter at the beginning of each analysis. The control filter is handled in the same manner as those filters used for sample analyses however, only sterile buffered rinse water is filtered. The control filter is placed on the same bacterial medium used for incubation of filters from the next sample, so that all filters are incubated under the same conditions. If any bacteria appear on the control filter, they were likely carried over from the previous sample. No target or indicator organisms and <10 non-target or background organisms should appear on the control filter. If these limits are exceeded, the senior technician/supervisor is consulted. If excessive bias is suspected the result will not be reported and if possible, the analyses will be repeated.

Duplicate Analyses

Duplicate analyses are conducted at a frequency of one in twenty samples. The data are accumulated for each parameter and a within-run standard deviation is calculated to give a measure of the repeatability of results. The calculation of the standard deviation is the same as that used in section 2.1 under Sample Repeatability. A control limit is established based on historical data whereby, the observed differences in duplicate results are sorted according to ranges of colony counts per filter. At present three ranges are used: 0 - 30, 31 - 75, and 76 - 150 colonies per filter. The mean difference within each range is multiplied by 3.267 (3). If the control limit is exceeded the senior technician/supervisor is consulted. If excessive bias is suspected, the results will not be reported.

Media Quality Control

A number of checks are made both during and after the preparation of a batch of medium. The pH of a medium is monitored after all the ingredients have been added and again after sterilization has taken place. The final pH may vary within ±0.2 units from the recommended value. The medium is checked for sterility at both 20°C and 35°C by incubating random samples of either tubes or plates depending on how the medium is dispensed. Any bacterial growth will require re-testing of the medium for sterility. Confirmation of contamination will result in the rejection of the medium for any further use. The batch or lot number of a medium is recorded to determine if any changes in quality occur when batch or lot numbers change.

Differential agar media used in the detection and enumeration of indicator bacteria are tested to ensure their proper functioning. The medium is streaked with both a known target organism or positive culture and a known non-target organism or negative culture. If the medium is functioning properly, growth of the target organism will be abundant after 24 to 48 hours and growth of the non-target organism will not occur or will be minimal even after 72 hours of incubation. The results of all such tests are recorded and any deviations from the expected results will require re-testing or rejection of the medium.

A quantitative QC test of agar media for membrane filter tests involves making up dilute suspensions of the positive and negative cultures. Selected dilutions of these suspensions are passed through membrane filters, which are then placed on plates of both the inhibitory or selective medium and plates of a non-inhibitory or non-selective medium, such as Brain Heart Infusion agar. The positive culture should form approximately the same number of colonies on the selective and non-selective media plates, whereas the negative culture should only form colonies on the non-selective medium. This procedure is conducted on one out ten media batches. Alternatively, one or more samples containing target organisms are filtered in duplicate and respective filters are placed on agar plates from the new and previous batch of medium. Results are recorded and statistically analyzed as for duplicate analyses. Media is re-tested and rejected if it fails to meet the past performance of the previous medium. Results are recorded and statistically using duplicate analysis format. Failure to meet the past performance of the previous medium is proceeded with action to re-test and reject.

Presence-Absence (P-A) Tests

Blank Control P-A Bottles

For each group of 21 samples, a blank control is prepared by pouring a 99 mL dilution blank into a P-A bottle and incubating it along with the regular P-A bottles. The P-A blank bottle is incubated for three to four days and should remain free of any bacterial growth or colour change. Growth in more than one P-A blank control test will require rechecking of the sterility of the dilution blanks and P-A medium.

Media Quality Control

A number of checks are performed on the P-A broth including: pH, sterility at 20°C and 35°C, and growth reaction of Escherichia coli (E. coli). If the medium is functioning properly, E. coli will produce a strong acid reaction (yellow colour in the medium) and agitation of the bottle will cause release of the dissolved gas in the medium producing a layer of foam at its surface.

In addition, a quantitative test of the P-A broth is done by pipetting 2 mL of broth onto a filter pad and filtering a suspension of E. coli through a membrane filter, which is then placed on the filter pad saturated with the P-A broth. A second MF is prepared with a similar volume of an E. coli suspension and placed on Brain Heart Infusion agar in a petri dish. Previous testing has shown that E. coli colony counts on both filters should be approximately the same. Quality Control checks on EC broth, Lactose Purple broth, MacConkey agar, Nutrient Gelatin Yeast Extract agar and Mannitol Salt agar include pH readings, sterility and bacterial growth reactions of positive and negative cultures inoculated onto or into each medium. If any Quality Control tests fail, the medium is either re-tested or rejected.

Sample Age

The accurate determination of bacterial numbers for indicator or heterotrophic bacteria in a sample depends on how quickly the sample can be transported to the laboratory for analysis. Water samples should be kept as close to the original water temperature by using a foam-packed container, which includes a central plastic bottle containing water that has been frozen, or by cooling to refrigeration temperatures before shipment to the laboratory. (10)

Samples should arrive at the laboratory on the same day as sampled or, if refrigerated, within 24 hours. For sewage effluent and surface water samples, no analysis will be done if the samples are older than 48 hours; for drinking water samples, the time limit is 72 hours, and for legal samples, it is 24 hours. Limits on the age of samples for analysis must be in place as bacterial numbers in samples may increase or decrease depending on nutrients, toxic elements and the influence of temperature on the metabolic activities of the organisms. The longer the time period between sampling and analysis, the greater the chance for producing either inflated or deflated numbers of organisms per 100 mL of sample.

3.2 PERFORMANCE SUMMARIES

MICROBIOLOGY

*** ESCHERICHIA COLI ***

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: 1979
		Units	: Counts/100mL
LIS Test Name Code	: ECMF	Unit Code	: 301532
Work Station Code	: MSBACIND	Supervisor	: J. Clark
Method Code	: TFC 24		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hour at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. After incubation the membrane filter is transferred to a pad soaked in urease reagent and is given a reaction time of 15 minutes. All colonies that were yellow on mTEC agar and remain yellow on urease are counted as E. coli. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

ESCHERICHIA COLI

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
76	0 - 30	3.0	2.8	18.9
29	31 - 75	6.4	5.5	10.4
9	76 - 150	6.6	6.6	5.9

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A	N.A	N.A

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: mTEC agar (previous batch) vs mTEC agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
69	0 - 30	3.8	3.6	24
126	31 - 75	7.1	6.2	11.7
47	76 - 150	7.4	7.2	6.4

MEDIUM QC: mTEC agar (selective) vs Brain Heart Infusion agar (non-slelctive).
Test organism - E. coli.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
43	0 - 30	3.9	3.7	24.7
93	31 - 75	7.3	6.5	12.3
87	76 - 150	8.2	8.5	7.5

*** FECAL COLIFORMS ***

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1979
	: Municipal Drinking Water	Units	: Counts/100mL
		Unit Code	: 301532
		Supervisor	: J. Clark
LIS Test Name Code	: FCMF		
Work Station Code	: MSBACIND		
	: WQMFPA		
Method Code	: TF1 24		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Surface, Waste and Drinking Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mTEC agar and incubated for 23 +/- 1 hours at 44.5 +/- 0.5°C to allow for colony development. The temperature is gradually elevated by incubating 10 plates (2 stacks of 5 plates placed in the centre of a plastic container with lid) with 2 plastic jars containing ice (50 mL of water), one placed at each end of the plastic container. All yellow, yellow brown, and yellow green colonies are counted as fecal coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

FECAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
220	0 - 30	2.3	2.2	14.6
71	31 - 75	6.3	5.4	10.2
40	76 - 150	6.2	5.8	5.1

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
6648	25	0.38

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: mTEC agar (previous batch) vs m TEC agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
69	0 - 30	3.8	3.6	24
126	31 - 75	7.1	6.2	11.7
47	76 - 150	7.4	7.2	6.4

MEDIUM QC: mTEC agar (selective) vs Brain Heart Infusion agar (non-selective). Test organism - E. coli.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
43	0 - 30	3.9	3.7	24.7
93	31 - 75	7.3	6.5	12.3
87	76 - 150	8.2	8.5	7.5

FECAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
94	0 - 30	2.1	2.0	13.5
22	31 - 75	6.1	4.8	9.1
4	76 - 150	9.3	8.2	7.3

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A	N.A	N.A

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: mTEC agar (previous batch) vs mTEC agar (new batch) - inoculated with surface or waste water sample

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
69	0 - 30	3.8	3.6	24
126	31 - 75	7.1	6.2	11.7
47	76 - 150	7.4	7.2	6.4

MEDIUM QC: mTEC agar (selective) vs Brain Heart Infusion agar (non- selective). Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
43	0 - 30	3.9	3.7	24.7
93	31 - 75	7.3	6.5	12.3
87	76 - 150	8.2	8.5	7.5

*** FECAL STREPTOCOCCUS ***

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: Apr. 1972
		Units	: Counts/100mL
LIS Test Name Code	: FSMF	Unit Code	: 301532
Work Station Code	: MSBACIND	Supervisor	: J. Clark
Method Code	: EF 48		
Method Reference No.	: E3110A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 ml glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mEnterococcus agar and incubated for 48 +/- 3 hours at 35 +/- 0.5^{0}C to allow for colony development. All colonies that are red, maroon or pink are counted as fecal streptococcus. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs non selective medium
	: Comparison of target counts on an old vs a new batch.

FECAL STREPTOCOCCUS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
182	0 - 30	2.5	2.3	15.6
97	31 - 75	5.2	4.8	9
32	76 - 150	9.3	7.9	7

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A	N.A	N.A

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: m Enterococcus agar (previous batch) vs m Enterococcus agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
37	0 - 30	3.1	2.8	18.7
78	31 - 75	4.9	4.7	8.9
18	76 - 150	7.6	6.3	5.6

MEDIUM QC: m Enterococcus agar (selective) vs Brain Heart Infusion agar (non-selective). Test organism - S. faecalis.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
24	0 - 30	3.7	3.5	23.3
51	31 - 75	5.0	4.6	8.7
17	76 - 150	10.4	8.6	6.5

*** HETEROTROPHS ***

IDENTIFICATION:

Laboratory	: Surface and Waste Water	Method Introduced	: April 1, 1979
	: Municipal Drinking Water	Units	: Counts/mL
		Unit Code	: 301532
		Supervisor	: J. Clark
LIS Test Name Code	: HB35MF		
Work Station Code	: MSBACIND		
	: WQMFPA		
Method Code	: SF 48		
Method Reference No.	: E3110A		
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mHPC agar and incubated for 48 +/- 3 hours at 35 +/- 0.5^{0}C to allow for colony development. All colonies are counted as heterotrophs. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Comparison of colony counts on an old vs a new batch are done using water samples.

HETEROTROPHS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
89	0 - 30	1.8	1.6	10.9
4	31 - 75	4.0	2.9	5.4
3	76 - 150	16.0	11.6	10.3

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
878	126	14.4

QUALITY CONTROL DATA FROM 01/01/88 TO 01/12/92

MEDIUM QC: m HPC agar vs BHI agar (new batch).
Inoculated with pure culture - A. calcoaceticus.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
40	0 - 30	3.2	2.9	19.5
20	31 - 75	6.1	5.5	10.3
14	76 - 150	13.9	12.5	9.4

HETEROTROPHS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
97	0 - 30	2.2	2.0	13.4
12	31 - 75	13.3	10.4	19.7
8	76 - 150	13.0	11.3	10

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
1221	192	15.7

QUALITY CONTROL DATA FROM 01/01/88 TO 01/12/92

MEDIUM QC: m HPC agar vs BHI agar (new batch).
Inoculated with pure culture - A. calcoaceticus.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
40	0 - 30	3.2	2.9	19.5
20	31 - 75	6.1	5.5	10.3
14	76 - 150	13.9	12.5	9.4

*** PRESENCE-ABSENCE (P-A) TEST ***

IDENTIFICATION:

Laboratory	: Municipal Drinking Water	Method Introduced	: 1968
		Units :Present/Absent/100mL	
LIS Test Name Code	: PABOT	Unit Code	: 999000
Work Station Code	: WQMFPA	Supervisor	: J. Clark
Method Code	: LLSB10		
Method Reference No.	: E3226A		
Sample Type/Matrix	: Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

A 100 mL volume of sample is added to a presence-absence (P-A) bottle. The bottle is incubated at 35°C for 3 to 4 days and examined every 24 hours for acid or acid and gas formation. When a positive reaction for acid or acid and gas occurs, inoculum is transferred to confirmatory media to determine the presence of total coliforms, fecal coliforms and other indicator organisms.

REPORTING:

Microbiological parameters are reported either as present or absent per 100 mL of sample.

CONTROLS:

: A blank control sample is included for every 20 to 25 samples.

Medium QC : P-A broth batches are checked for sterility at 20° and 35°C and inoculation of the medium is done with E. coli to determine its response. Dilutions of E. coli are passed through membrane filters which are subsequently placed on filter pads saturated with P-A broth and on an enrichment medium, such as Brain Heart Infusion Agar, to compare numbers of colonies recovered.

PRESENCE-ABSENCE (P-A) TEST

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Municipal Drinking Water

P-A CONTROLS:

Number of samples analyzed by P-A	Number of P-A controls	Number of positive P-A controls	Percent positive P-A controls
13768	688	4	0.58

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: P-A Broth (selective) vs Brain Heart Infusion agar (non - selective).
Test Organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
120	0 - 30	3.7	3.8	25.3
90	31 - 75	6.9	6.3	11.9
87	76 - 150	9.3	9.2	8.1

*** PSEUDOMONAS AERUGINOSA ***

IDENTIFICATION:

Laboratory	: Surface and Waste Waters	Method Introduced	: May 1980
LIS Test Name Code	: PSAMF	Units	: Counts/100mL
Work Station Code	: MSBACIND	Unit Code	: 301532
Method Code	: PF 48	Supervisor	: J. Clark
Method Reference No.	: E3109A		
Sample Type/Matrix	: Surface and Waste Waters		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mPA agar and incubated for 48 +/- 2 hours at 41.5 +/- 0.5°C to allow for colony development. All colonies that are dark brown, brown with darkened centers, tan and usually very flat in appearance are counted as Pseudomonas aeruginosa. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

Duplicate samples and blank filter between each sample.

Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

PSEUDOMONAS AERUGINOSA

QUALITY CONTROL DATA FROM 01/01/92 TO 01/12/92

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
76	0 - 30	1.5	1.4	9.3
5	31 - 75	6.2	5.5	10.4
5	76 - 150	7.2	6.4	5.6

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
N.A	N.A	N.A

QUALITY CONTROL DATA FROM 01/01/88 TO 01/12/92

MEDIUM QC: mPA agar (previous batch) vs mPA agar (new batch) - inoculated with surface or waste water sample.

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
19	0 - 30	2.8	2.6	17.2
15	31 - 75	4.3	3.7	6.9
9	76 - 150	4.2	3.7	3.3

MEDIUM QC: mPA agar (selective) vs Brain Heart Infusion agar (non-selective). Test organism - P.aeruginosa

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
8	0 - 30	5.1	4.9	32.7
15	31 - 75	13.9	12.6	23.8
5	76 - 150	11.6	9.9	8.8

*** TOTAL COLIFORMS ***

IDENTIFICATION:

Laboratory	: Surface and Waste Water : Municipal Drinking Water	Method Introduced	: Jan. 1971
LIS Test Name Code	: TCMF	Units	: Counts/100mL
Work Station Code	: MSBACIND : WQMFPA	Unit Code	: 301532
Method Code	: LF 22	Supervisor	: J. Clark
Method Reference No.	: E3106A		
Sample Type/Matrix	: Surface Water,Drinking Water		

SAMPLING:

Quantity Required	: 100 mL
Container	: 250 mL glass or plastic
Preservative	: Sodium Thiosulphate

ANALYTICAL PROCEDURE:

Samples are analyzed by the membrane filter (MF) procedure using aseptic technique. The sample and/or dilution water are filtered through a water permeable membrane which traps the bacteria on the filter. The filter is placed onto the surface of mENDO LES agar and incubated for 22 +/- 2 hours at 35 +/- 0.5^{0}C to allow for colony development. All colonies with a dull to bright metallic green-gold sheen are counted as coliforms. An ideal counting range is 10 to 100 colonies per filter.

REPORTING:

Maximum Significant Figures: 3
Minimum Increment: 1
Detection Criteria: 10

CONTROLS:

	: Duplicate samples and blank filter between each sample.
Medium QC	: Target organism count on selective medium vs nonselective medium.
	: Comparison of target counts on an old vs a new batch.

TOTAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Surface and Waste Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
60	0 - 30	2.0	1.8	11.8
8	31 - 75	9.8	7.6	14.4
3	76 - 150	11.3	9.0	8.0

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
580	2	0.34

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: mEndo agar LES (selective) vs Brain Heart Infusion agar (non- selective).
Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
89	0 - 30	3.6	3.5	23.1
82	31 - 75	6.5	6.5	12.3
95	76 - 150	6.3	6.3	5.8

TOTAL COLIFORMS

QUALITY CONTROL DATA FROM 01/01/92 TO 31/12/92

Lab: Municipal Drinking Water

Analytical Range: 0 to 150 counts/filter

DUPLICATES: Within-run precision

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
106	0 - 30	2.2	2.0	13.5
19	31 - 75	4.4	3.7	6.7
12	76 - 150	7.5	6.9	6.1

CONTROL FILTERS:

Number of controls	Number of positive controls	Percent positive
3375	48	1.4

QUALITY CONTROL DATA FROM 01/01/88 TO 31/12/92

MEDIUM QC: mEndo agar LES (selective) vs Brain Heart Infusion agar (non- selective). Test organism - E. coli

Number of Data	Counts per filter	Mean difference	Standard dev (2)	Coefficient of var. (%)
89	0 - 30	3.6	3.5	23.1
82	31 - 75	6.5	6.5	12.3
95	76 - 150	6.3	5.6	5.8

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ABBREVIATIONS

AAS	- Atomic Absorption Spectrophotometer
Abs	- Absorbance
APIOS	- Acidic Precipitation in Ontario Study
Av	- Average
Bl	- Blank
C	- Degrees Centigrade
cm	- Centimeter
Concn	- Concentration
Date	- Day/Month/Year
DDW	- Deionized, distilled water
DO	- Dissolved oxygen
DW	- Distilled water
ECSS	- Expert Committee on Soil Survey (Land Resource Research Centre)
EPA	- Environmental Protection Agency
FTU	- Formazin Turbidity Units
g	- Gram
HOAC	- Acetic Acid
HZU	- Hazen Units
IR	- Infra-Red
L	- Litre
LAB	- Laboratory
LIS	- Laboratory Information System
LTBL	- Long Term Blank
M	- Molar
meq	- Milliequivalent
mg	- Milligram
min	- Minute

ABBREVIATIONS cont'd

mL	-	Millilitre
mm	-	Millimeter
N/A	-	Not Available or Not Applicable
nm	-	Nanometer
NRC	-	National Research Council
QC	-	Quality Control
QCA	-	Quality Control Standard A
QCB	-	Quality Control Standard B
QCC	-	Quality Control Standard C
QCD	-	Quality Control Standard D
R	-	Recovery
rpm	-	Revolutions per minute
S	-	Between run standard deviation
S_1	-	Standard deviation (conventional)
S_2	-	Standard deviation for duplicates
S_w	-	Within run standard deviation
S. Class	-	Weight classification designation (not certified)
s.d.	-	Standard deviation
Standard Cal	-	Colourimeter setting to control electronic expansion
STD	-	Standard
TCU	-	True Colour Units
µm	-	Micrometer
µeq	-	Microequivalent
µg	-	Microgram
µS	-	Micro-Siemen
UV	-	Ultra-Violet
V/V	-	Concentration based on volume measurements

APPENDIX A

W & T:

W and T are low level data qualifiers assigned to data that are near or below the detection limit values (3)(5). The code <W indicates that no measurable response was observed under the test conditions. The reported value indicates the minimum amount of analyte that could have been measured under routine conditions. W is usually less than the standard deviation of duplicates near zero. The <T code is used to represent a measurable amount of the analyte which under the test conditions is not verifiable. The reported result should be used only for large batches of similar data to evaluate background levels or trends of contaminants in the environment where more sensitive analytical methods are not available.

To provide a consistent Laboratory Services Branch approach to data reporting, the Water Quality Analyses Section calculates W from the standard deviation of duplicates (S_2), near zero, by rounding down to the nearest 1,2 or 5 digit. T is five times W. The latest calculations, valid at date of publication for W and T values of all active work stations, are contained in this report. (APPENDIX B)

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1992

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Acidity, Gran	µg/L H^+	PHACD	ACDG	1000	1.0	5.0
Acidity, Total Fixed Endpoint	mg/L $CaCO_3$	PHACD	ACDT	100	0.05	0.25
Alkalinity, Gran	mg/L $CaCO_3$	DOT	ALKT1	25		
	mg/L $CaCO_3$	RATS	ALKT1	25		
Alkalinity, Total Fixed Endpoint 4.5.	mg/L $CaCO_3$	DOT	ALKT	100	0.05	0.25
	mg/L $CaCO_3$	RATS	ALKT	1000	0.2	1.0
	mg/L $CaCO_3$	WATS	ALKT	1000	0.2	1.0
	mg/L $CaCO_3$	WQSDIRT	ALKT	1000	0.5.	2.5
Total Fixed Endpoint 3.8.	mg/L $CaCO_3$	DOT	ALKT3	100	0.05.	0.25
Aluminum, Reactive Species	µg/L as Al	DOALSP	ALEXCV	1000	2.0	10
Reactive Species	µg/L as Al	DOALSP	ALNDCV	1000	2.0	10
Total	µg/L as Al	DOAL	ALUT	1000	2.0	10
Cadmium, Total	µg/L as Cd	DOTRACE	CDUT	5	0.001	0.005
Calcium	mg/L as Ca	PRAA400	CAUR	2	0.005	0.025
	mg/L as Ca	PRAAS	CAUR	8	0.02	0.1
	mg/L as Ca	RMAAS	CAUR	40	0.05	0.25
	mg/L as Ca	WAAS	CAUR	200	0.2	1.0
Carbon, Dissolved Inorganic	mg/L as C	DODIC	DIC	10	0.02	0.1
	mg/L as C	ROM	DIC	40	0.2	1.0
Carbon, Dissolved Organic	mg/L as C	ROM	DOC	20	0.1	0.5
Carbon, Total Organic	mg/L as C	WAC	TOC	50	1.0	5.0
Chloride	mg/L as Cl	COCL	CLIDUR	100	0.2	1.0
	mg/L as Cl	PRIC1	CLIDUR	2	0.01	0.05
	µg/filt Cl	PRLOV	CLIDUR	100	1.0	5.0
Colour, True	TCU	DOCOL	COLTR	100	0.2	1.0
	TCU	WCOL	COLTR	100	0.2	1.0
Conductivity	µS/cm	DOCOND	COND25	500	0.2	1.0
	µS/cm	PRCON	COND25	100	0.2	1.0
	µS/cm	RATS	COND25	2000	1.0	5.0
	µS/cm	WATS	COND25	2000	1.0	5.0
	µS/cm	WQSDIRT	COND25	10000	5.0	25
Copper, Total	µg/L as Cu	DOTRACE	CUUT	10	0.003	0.015

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1992

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Fluoride	µg/L as F	DOSPF	FFIDUR	70	0.2	1.0
	mg/L as F	WFNO3	FFIDUR	2	0.01	0.05
Hardness	mg/L as $CaCO_3$	PRAAS	HARDT		0.05	0.25
	mg/L as $CaCO_3$	RMAAS	HARDT		0.2.0	1.0
	mg/L as $CaCO_3$	WAAS	HARDT		0.5	2.5
Iron, Total	µg/L as Fe	DOFEMN	FEUT	1000	2.0	10
Lead, Total	µg/L as Pb	DOTRACE	PBUT	10	0.003	0.015
Magnesium	mg/L as Mg	PRAA400	MGUR	0.5	0.001	0.005
	mg/L as Mg	PRAAS	MGUR	2	0.005	0.025
	mg/L as Mg	RMAAS	MGUR	10	0.02	0.1
	mg/L as Mg	WAAS	MGUR	50	0.1	0.5
Manganese, Total	µg/L	DOFEMN	MNUT	200	1.0	5.0
Nitrogen, Ammonia plus Ammonium	µg/L as N	DONUT	NNHTFR	1000	1.0	5.0
	µg/filt N	PRAM	NNHTFR	50	0.05	0.25
	mg/L as N	PRAM	NNHTFR	2	0.002	0.01
	mg/L as N	PRAM	NNHTUR	2	0.002	0.01
	mg/L as N	RNDNP	NNHTFR	2	0.002	0.01
	mg/L as N	SDNP	NNHTFR	50	0.05	0.25
Nitrogen, Nitrate	mg/L as N	PRIC1	NNO3UR	1	0.01	0.05
	µg/filt N	PRLOV	NNO3UR	100	0.5	2.5
	µg/filt N	PRSEQ	NNO3FR	50	0.2	1.0
	µg/filt N	PRSEQ	NNRICF	50.	0.2	1.0
Nitrogen, Nitrate plus Nitrite	µg/L as N	DONUT	NNOTFR	1000	2.0	10
	mg/L as N	RNDNP	NNOTFR	5	0.005	0.025
	mg/L as N	SDNP	NNOTFR	50.	0.05	0.25
	mg/L as N	WFNO3	NNOTUR	20	0.1	0.5
Nitrogen, Nitrite	mg/L as N	RNDNP	NNO2FR	0.2	0.001	0.005
	mg/L as N	SDNP	NNO2FR	2	0.005	0.025
Nitrogen, Total Kjeldahl	mg/L as N	RTNP	NNTKUR	2	0.02	0.1
	mg/L as N	STKNP	NNTKUR	50	0.05	0.25
Oxygen Demand, Biochemical	mg/L as O	SBBOD5	BOD5	400	0.2	1.0
Oxygen Demand, Chemical	mg/L as O	RCOD	COD	40	1.0	5.0
	mg/L as O	SBCOD	COD	500	2.0	10

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1992

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
pH		DOCOP	PH	14		
		DOT	PH	14		
		PHACD	PH	14		
		RATS	PH	14		
		WATS	PH	14		
		WQSDIRT	PH	14		
Phenolics, Reactive	µg/L Phenol	MPHEN	PHNOL	50	0.2	1.0
	µg/L Phenol	ROPHEN	PHNOL	40	0.2	1.0
Phosphorus, Reactive ortho-Phosphate	mg/L as P	RNDNP	PPO4FR	0.1	0.001	0.005
	mg/L as P	SDNP	PPO4FR	10	0.02	0.1
Phosphorus, Total	mg/L as P	RTNP	PPUT	0.2	0.002	0.01
	mg/L as P	STKNP	PPUT	10	0.02	0.1
	mg/L as P	DOP	PPUT1	50	0.2	1.0
	mg/L as P	DOP	PPUT2	50	0.2	1.0
Potassium	mg/L as K	PRAA400	KKUR	1	0.002	0.010
	mg/L as K	PRAAS	KKUR	1	0.005	0.025
	µg/filt K	PRLOVAA	KKUR	50	0.1	0.5
	mg/L as K	RMAAS	KKUR	5	0.01	0.05
	mg/L as K	WAAS	KKUR	25	0.05	0.25
Silicon, Reactive Silicates	mg/L as Si	ROM	SIO3UR	10	0.02	0.1
Sodium	mg/L as Na	PRAA400	NAUR	1	0.002	0.01
	mg/L as Na	PRAAS	NAUR	4	0.005	0.025
	µg/filt Na	PRLOVAA	NAUR	50	0.1	0.5
	mg/L as Na	RMAAS	NAUR	20	0.02	0.1
	mg/L as Na	WAAS	NAUR	100	0.2	1.0
Solids, Dissolved	mg/L	SOLIDS	RSF	5000	2.0	10
Solids, Ignited (Particulate Ash)	mg/L	SOLIDS	RSPA	7000	0.5	2.5
Ignited (Paticulate Loss on Ignition)	mg/L	SOLIDS	RSPLOI	3000	0.5	2.5
Particulate	mg/L	SOLIDS	RSP	3000	0.5	2.5
Total	mg/L or mg/Kg	SOLIDS	RST	60000	2.0	10
Sulphate	mg/L as SO_4	PRIC1	SSO4UR	5	0.05	0.25
	mg/L as SO_4	PRIC1	SSO4UR	10	0.05	0.25
	µg/filt as SO_4	PRLOV	SSO4UR	500	1.0	5.0
	µg/filt as SO_4	PRSEQ	SSO4FR	250	1.0	5.0
	µg/filt as SO_4	PRSEQ	SSO4NF	250	1.0	5.0
	mg/L as SO_4	RMDSO4	SSO4UR	100	0.5	2.5

APPENDIX B

W AND T VALUES FOR DATA REPORTED IN 1991

PARAMETER	UNITS	WORKSTN CODE	TEST CODE	FULL SCALE	W	T
Sulphur Dioxide	µg/filt as SO_2	PRSEQ	SSO2FR	350	1.0	5.0
Turbidity	FTU	RMTUB	TURB	200	0.05	0.25
	FTU	WTURB	TURB	200	0.05	0.25
	FTU	ROBOTURB	TURB	2000	0.01	0.05
Zinc, Total	µg/g as Zn	DOTRACE	ZNUT	20	0.001	0.005

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